ELECTRICAL SAFETY SOLUTIONS /

DC CIRCUIT BREAKERS FOR INDUSTRIAL APPLICATIONS Type **UR**

FOR INDUSTRY

Sécheron

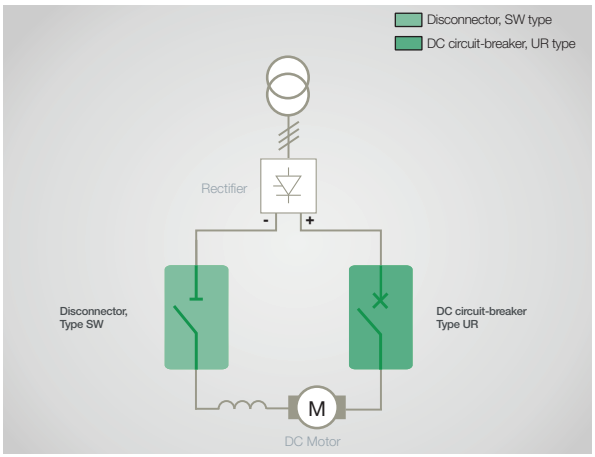
GENERAL INFORMATION

The DC circuit-breakers **UR** range has achieved worldwide acceptance as a well proven design for use in fixed installations. The complete range has been regularly upgraded and adapted to new standard requirements and for different applications over the years, continuously improving the level of performance and functionality.

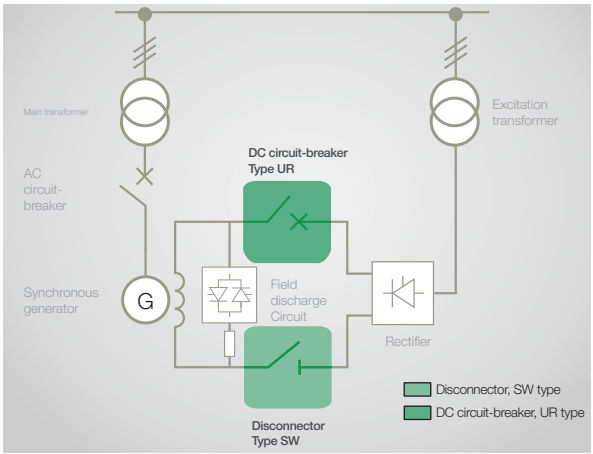
These have led to an impressive service track record throughout the world for the **UR** product range. Combining a compact design with a high making and breaking capacity, the UR range, with its low number of parts also guarantees high reliability and low maintenance requirements.

APPLICATIONS

- **example :** rolling mill drive for steel factory.



- **example :** static excitation for power generator.



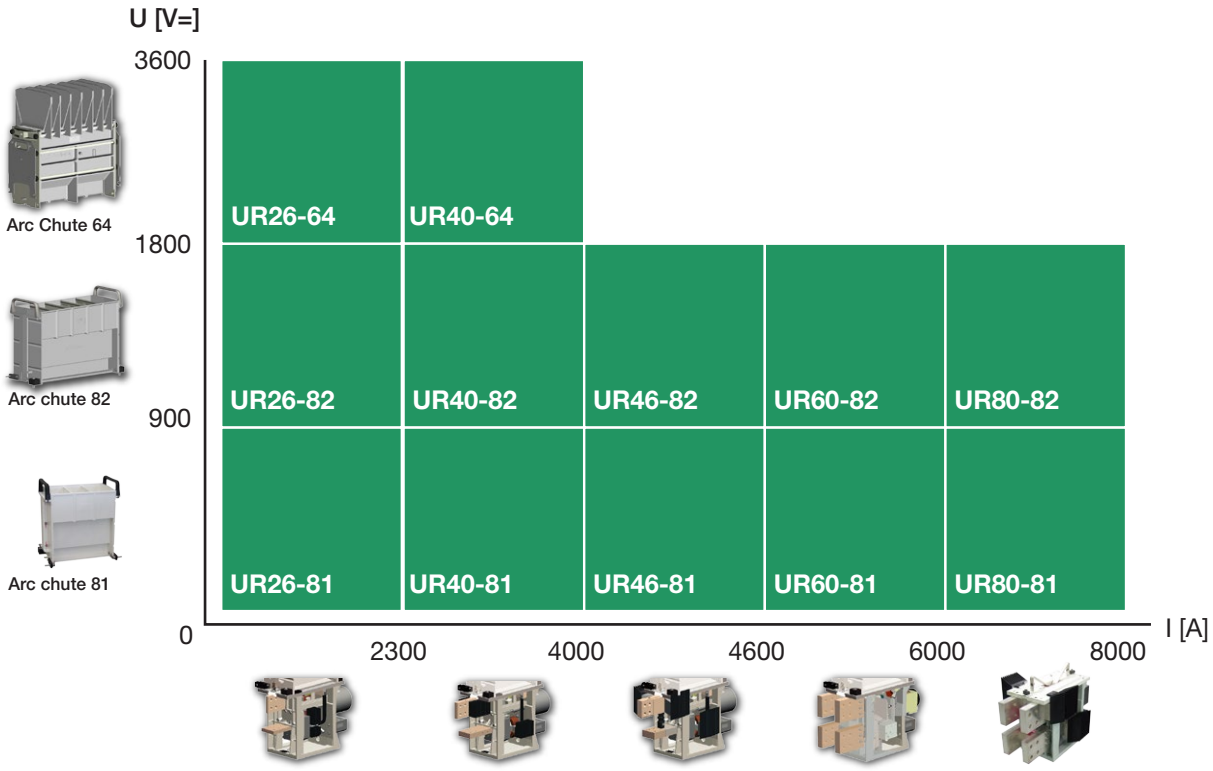
- **Other example of application :**

- Cycloconverter or DC drives
- Solar energy
- Energy storage or UPS
- Battery charging stations.
- Mining (Hoists, grinding mills, electric mining haul trucks,..)
- Chemical plants (electrolysis,..)
- Marine
- Others...

MAIN BENEFITS

- Safe with a high insulation level.
- Very low maintenance requirements with high electrical and mechanical endurances
- 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 900V_{DC}/1'800V_{DC}. For more information on this breaker type, refer to its specific brochure SG104147BEN.

MAIN FEATURES

- Thermal current up to 8'000 A
- Rated voltage 900 V_{DC}, 1'800 V_{DC} and 3'600 V_{DC}
- Indoor installation
- Bi-directional
- Trip-free direct acting device
- Limited maximum arc voltage
- Electro-magnetic closing with electric or magnetic holding
- Reference standards: IEC60947-2, GB14048-2, EN50123-1 /-2 ,IEC61992-1 /-2, IEC77
- Insulation material according to EN45545-2:2013


TYPE TEST REPORT

DATA FOR PRODUCT SELECTION

	Symbol	Unit	UR26	UR40	UR46	UR60	UR80
MAIN HIGH VOLTAGE CIRCUIT							
Rated operational voltage							
- Arc chute type 81	U_{Ne}	[V_{DC}]	900	900	900	900	900
- Arc chute type 82			1'800	1'800	1'800	1'800	1'800
- Arc chute type 64			3'600	3'600	-	-	-
Conventional free air thermal current [1]	I_{th}	[A]	2'600	4'000	6'000	6'000	8'000
Ohmic short-circuit breaking capacity							
- at U_e 900 V_{DC} (arc chute type 81)	$\hat{I}_{ss}$ / I_{ss}	[kA]/ [kA]	180/125	180/125	180/125	180/125	180/125
- at U_e 1'800 V_{DC} (arc chute type 82)			114/80	114/80	114/80	114/80	114/80
- at U_e 3'600 V_{DC} (arc chute type 64)			57/40	57/40	-	-	-
Inductive short-circuit breaking capacity							
- at Ue 900 VDC (arc chute type 81)	I_{ss} / T_c	[kA]/ [ms]	100/15	100/15	100/15	100/15	100/15
- at Ue 1'800 VDC (arc chute type 82)			52/21	52/21	52/21	52/21	52/21
- at Ue 3'600 VDC (arc chute type 64)			26/21	26/21	-	-	-
Maximum arc voltage							
- Arc chute type 81	$\hat{U}_{arc}$	[V]	≤ 2'500	≤ 2'500	≤ 2'500	≤ 2'500	≤ 2'500
- Arc chute type 82			≤ 4'000	≤ 4'000	≤ 4'000	≤ 4'000	≤ 4'000
- Arc chute type 64			≤ 8'000	≤ 8'000	-	-	-

[1] At T_{amb} = +40°C and tested with high voltage connections according to standards EN50123 and IEC61992.•

LOW VOLTAGE AUXILIARY CIRCUIT

Control circuit

Nominal voltage	U_n	[V_{DC}]	24, 48, 110, 125, 220 [2]	
Range of voltage			[0.7 - 1.25] U_n	[0.8 - 1.1] U_n
Nominal closing power [2]		[W]/[s]	1'300/1	2'800/1
Holding power for electric holding [3]		[W]	2.3	30
Holding power for magnetic holding [3]		[W]	0	0
Opening power for magnetic holding [3]		[W]/[s]	25/1	170/1
Mechanical opening time on opening order [3] [4]	t_o	[ms]	15 to 30	15 to 30
Mechanical closing time [3] [4]	t_c	[ms]	~ 150	~ 150

Specific data for optional ECO-Drive (available only for 110V_{DC})

Nominal closing power [3]	P_c	[W]/[s]	1'300/0.5	-
Nominal holding power for electric holding [3]		[W]	<8	-
Nominal opening power for electric holding [3]		[W]	<1.6	-
Idle (standby) power [3] [4]		[W]	<1.6	-

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		[V_{DC}]	24 to 220
Conventional thermal current	I_{th}	[A]	10
Switching categories according to EN60947 (silver contacts)			
– AC-15 230 V_{AC}		[A]	1.0 A
– DC-13 110 V_{DC}		[A]	0.5 A

[2] For other control voltage or nominal voltage, please contact Sécheron. •
[3] At U_n and T_{amb} = +20°C. •
[4] Starting when the signal is received by the coil.

OPERATING CONDITIONS

Installation			Indoor				
Altitude		[m]	< 1'400 [5]				
Working ambient temperature [6]	T_{amb}	[°C]	-5 to +40				
Humidity			Class 5K2				
Pollution degree			PD3				
Minimum mechanical durability	N	Operations	4x 50'000	8x 25'000	8x 25'000	4x 20'000	4x 20'000

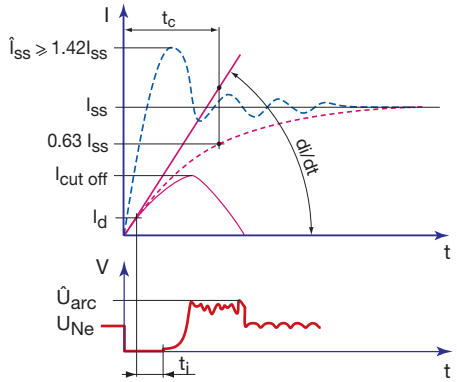
[5] For altitude > 1400 m, please contact Sécheron. •
[6] For ambient temperature outside of the range, please contact Sécheron.

	UR26	UR40	UR46	UR60	UR80
WEIGHTS (± 5 kg) [7]					
- Arc chute type 81	77	98	110	139	150
- Arc chute type 82	87	108	120	149	160
- Arc chute type 64	133	154	-	-	-

[7] For standard versions without options •

BREAKING CURRENT PARAMETERS

/// SHORT-CIRCUIT PARAMETERS



I_{ss} = Prospective sutainable Short-circuit current
$\hat{I}_{ss}$ = Peak of I_{ss}
I_d = Setting of maximum current release
$I_{cut\ off}$ = Cut off current
T_c = Time-constant of the circuit
t_i = Opening time
U_{arc} = Maximum arc voltage
U_{Ne} = Rated operational voltage

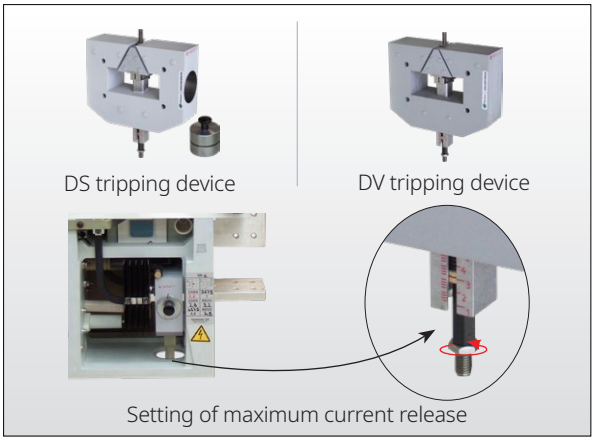
t_b = Total break time

Relationship between current, voltage and time when a short-circuit is interrupted by a DC circuit-breaker.

/// DIRECT OVER-CURRENT INSTANTANEOUS RELEASE

FOR UR26/40/46

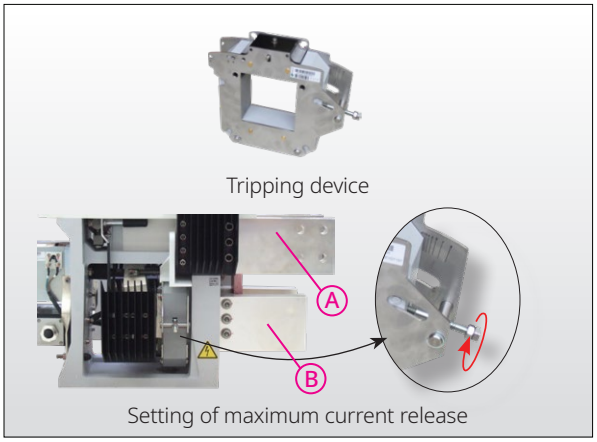
Standard tripping device



Tripping range (kA)					
UR26	UR40	UR46	type	Designation code (1) Standard	Options
1.4 - 2.7	-	-	DV1	A	
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	DS1	D	
-	4.0 - 15.0	4.0 - 15.0	DS2	F	
-	4.0 - 10.0	4.0 - 10.0	DV3		G

FOR UR60/80

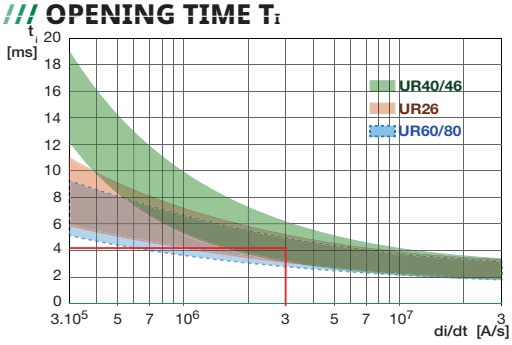
Standard tripping device



Tripping range (kA)		Designation code (1)
UR60	UR80	Standard
6.0 - 10.0	-	J
9.0 - 14.0	-	K
13.0 - 18.0	-	L
-	8.0 - 14.0	N
-	14.0 - 18.0	O
-	16.0 - 24.0	P

(1) Code to be used for the order form page 11.

/// OPENING TIME T_i



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

Example for a di/dt of $3x10^6$ A/s:

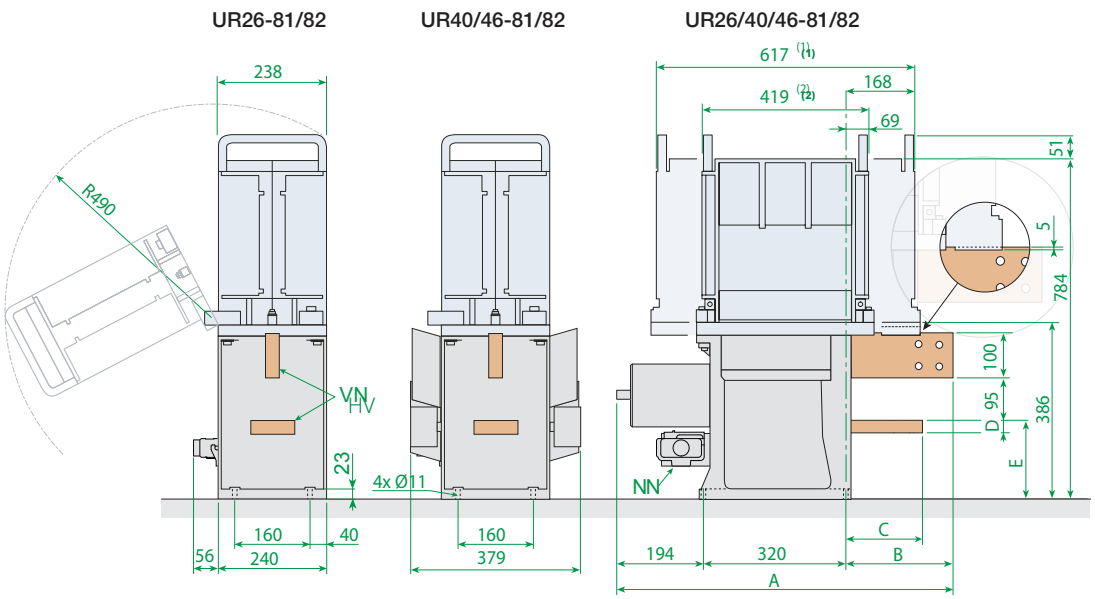
- for UR26: tl ~ 4.3 ms,
- for UR60/80: tl ~ 4.1 ms.

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

INFORMATION FOR PRODUCT INTEGRATION

MAIN DIMENSIONS FOR UR26/40/46

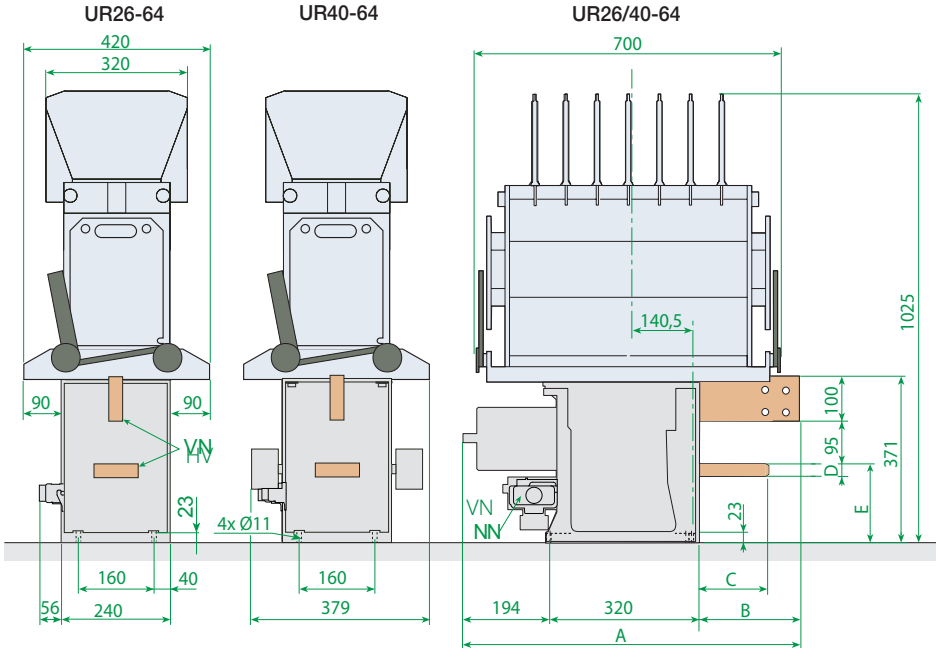
ARC CHUTE 81/82



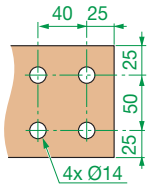
Dimensions without tolerances are indicative. All dimensions are in mm. The maximum allowed flatness deviation of the support frame is 0.5 mm.

(1) Arc chute 82
(2) Arc chute 81

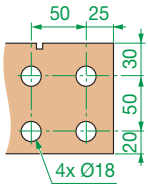
ARC CHUTE 64



HV connections for UR26/40/46
(except upper connection of UR46)



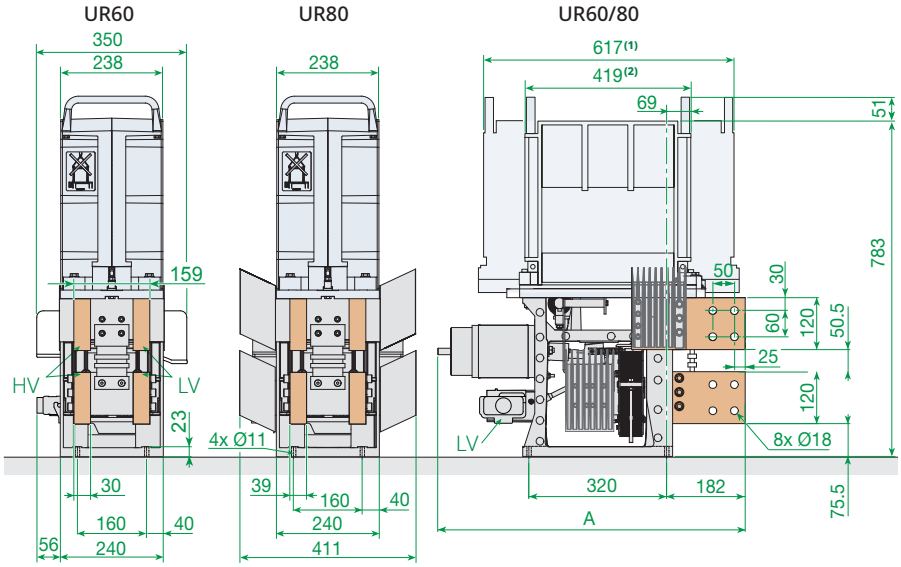
HV upper connection for UR46 only



Dimensions [mm]	UR26	UR40	UR46
Ⓐ	645	760	760
Ⓑ	131	246	246
Ⓒ	131	176	176
Ⓓ	20	30	40
Ⓔ	176	176	177

MAIN DIMENSIONS FOR UR60/80

ARC CHUTE 81/82



Dimension A [mm]	
Standard closing device (3):	
Electric holding	717
Magnetic holding	760
Specific closing device (4):	
Electric holding	748
Magnetic holding	748

(1) Arc chute 82

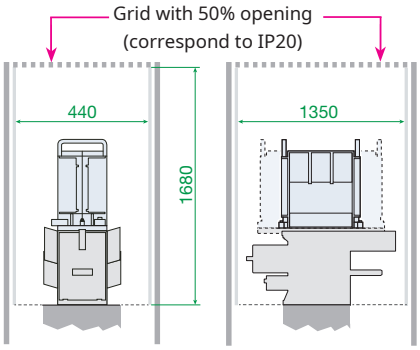
(2) Arc chute 81

(3) All breaker configurations excepted optional configuration of uni-directional breaker.

(4) Optional configuration of uni-directional breaker

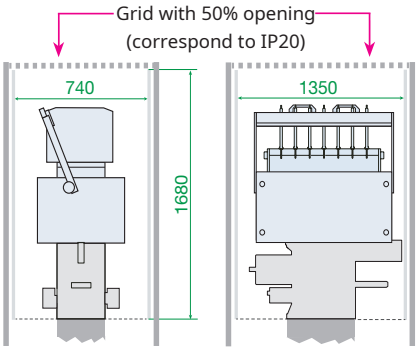
INSULATION DISTANCES FOR UR26/40/46/60/80

/// FOR UR..81/82S (except UR80)



Correspond to cubicle width 500 mm

/// FOR UR..64S and UR81/82S



Correspond to cubicle width 800 mm

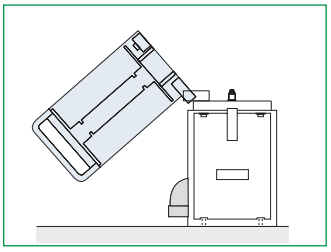
The DC circuit-breakers have been homologated according to EN50123-2/IEC61992-2 in cubicle's configurations with insulation panels on the area where dimensions are indicated in the below's representation and for short-circuit conditions as defined page 4. For particular cubicle configuration and short-circuit conditions, please contact Sécheron

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

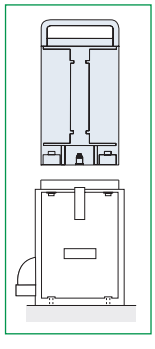
ARC CHUTE INSTALLATION

/// ARC CHUTE 81 AND 82

Opening to LV connector side for UR26/36/40/46 and for UR60/80 (1) with arc chute 82.

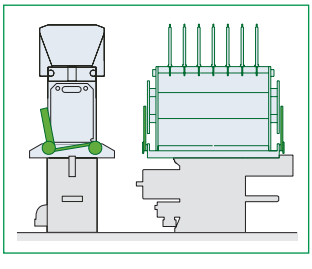


Vertical removal for UR60/80 (2)



/// ARC CHUTE 64

SE type includes two arc chute locking levers.



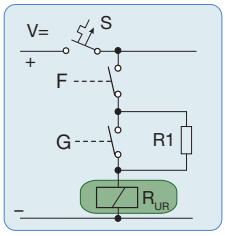
(1) For UR60/80, the configurations with "opening to LV connector side" is available only for arc chute 82.

(2) Configuration available for UR60/80 with arc chute 81.

LOW VOLTAGE CONTROL DIAGRAM

/// ELECTRIC HOLDING
E-TYPE

- The circuit breaker remains 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.

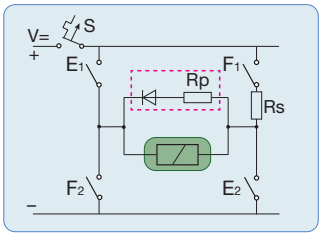


F, G : control contacts
R1 : holding resistor
S : automatic circuit breaker

Customer scope
Sécheron scope

/// 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. It requires the control voltage to be present to open.



E, F : control contacts
Rs : serial resistor
Rp : parallel resistor
S : automatic circuit breaker

Customer scope
Sécheron scope
Only for UR26 to UR46

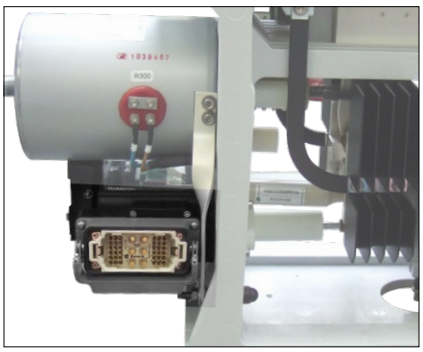
The UR range is equipped with a solenoid coil to perform the usual closing and opening operations.

Two different types of closing devices are available: with electric holding (E-type) or with magnetic holding (M-type).

Notes:
- crimping tools are not in the scope of Sécheron
- 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.
- The duration of the closing pulse (E-type & M-type) as well as the opening pulse (M-type) should be 0.5 - 1 s.

LOW VOLTAGE WIRING DIAGRAMS
FOR HARTING TYPE HAN®32 EE CONNECTOR (STANDARD)

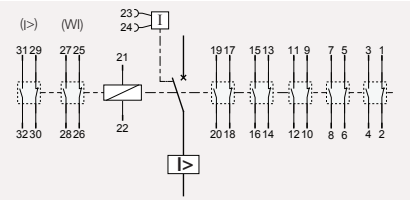
As standard, the UR circuit-breakers are delivered with HAN® 32 EE connector. The following wiring schemes represent the low voltage connector pins assignement in function of the selected configuration for standard or optional functions.



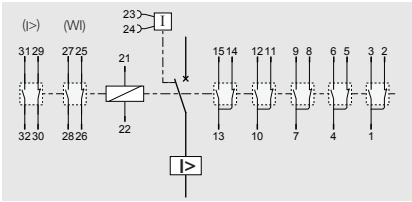
Harting type HAN® 32 EE
(Standard)

Notes:
- Only the pins related to your selected configuration page 11 will be wired according to the above's pin assignment. The connector will be delivered with all 32 pins even if not all wired.
- Indirect release coils BIM6 & BIM8 are connected to an auxiliary connector while BIM5 & BIM7 are connected to a terminal block (refer to page 10).
- They are valid for all control voltages except 24 V_{DC}. For 24 V_{DC} control scheme, please contact Sécheron.

AUXILIARY CONTACTS (SWITCH PF)



AUXILIARY CONTACTS (SWITCH CO)



Legend of the schemes:

- Circuit breaker main contact
- Low voltage connector interface (male pin)
- 1a+1b - Switch PF
- 1a+1b - Switch CO
- Direct overcurrent release
- Indirect overcurrent release
- Circuit breaker closing coil
- (WI) Wear indicator switch (option)
- (I>) Overcurrent release detector switch (option)

OPTIONS (SUBJECT TO ADDITIONAL COSTS)

MOBILE CONNECTOR - UR26/40/46/60/80

Auxiliary switches			Fixed connector type	Mobile connector (without cable)				
				Number of pin		Cable gland	Sécheron's number	Connector
Device	Number	Type		Size 2.5 mm²	Size 1.5 mm²			
UR26/36/40 /46/60/80	5a+5b	PF	Harting HAN® 32 EE	2	30	M32	SG104063R10100	

Note: crimping tools are not in the scope of Sécheron

ECO-DRIVE INTEGRATED CONTROL MODULE UR26/36/40/46

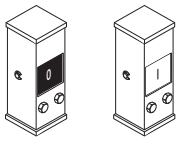
ECO-Drive is a compact control module integrated with UR circuit breakers, to manage closing-holding sequences with electric control. ECO-Drive is set on the UR breaker's closing device.

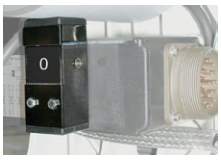
Note:
- Available for UR26/40/46
- Available for closing device with E-type holding

MAIN BENEFITS

- 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).

POSITION INDICATOR - UR26/40/46/60/80

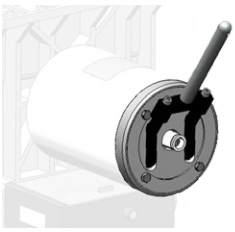




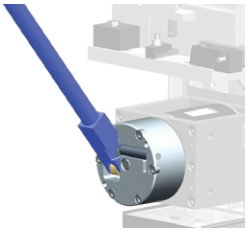
A mechanical position indicator actuated though a rod linked to the circuit breaker moving contact gives the position of the breaker: 0 = OPEN while I = CLOSED

MANUAL CLOSING DEVICE

/// FOR UR26/36/40/46



/// FOR UR60/80

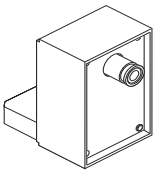


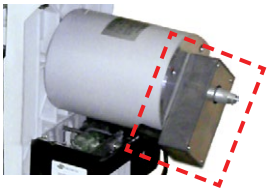
The manual closing device, mainly used for maintenance operations, enables to close and open the circuit breaker without low voltage supply and under no load.

CONTACT WEAR INDICATOR (WI) OR OVERCURRENT RELEASE DETECTOR (I>) UR26/40/46

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.





Contact wear indicator

BIM INDIRECT RELEASE (SHUNT TRIP)
WITH INTEGRATED MANUAL RELEASE

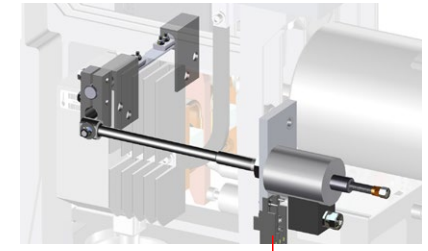
		Opening time	Control mode
UR26/36/40/46	**BIM5**	4 - 6 ms	CID-3[(1)]
	BIM6	12 - 19 ms	Direct battery 77-140 V_{DC}
UR60/80	**BIM7**	4 - 6 ms	CID-3[(1)]
	BIM8	12 - 19 ms	Direct battery 77-140 V_{DC}

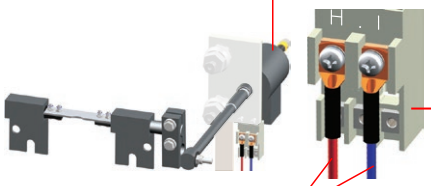
The indirect release enables to shorten the opening time when required by specific application. The choice of the relevant type has to be validated by Sécheron prior quoting. This device can also be manually activated.

[(1)] Not included in the DC circuit breaker - To be ordered separately

/// BIM5 & BIM6 - UR26/36/40/46

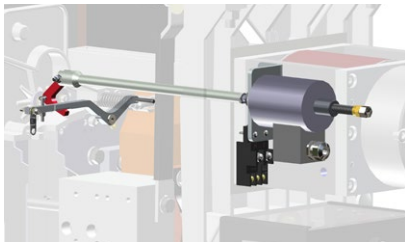
The terminal block allows the connection between 2.5 mm² cables from the BIM5 and 2.5 mm² cables from the battery and 6 mm² cables from the CID-3. BIM6 is directly connected to the low voltage connector.

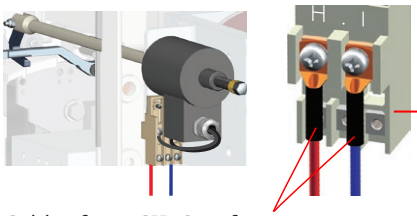




/// BIM7 & BIM8 - UR60/80

The terminal block allows the connection between 2.5 mm² cables from the BIM7 and 2.5 mm² cables from the battery and 6 mm² cables from the CID-3. BIM8 is directly connected to the low voltage connector.

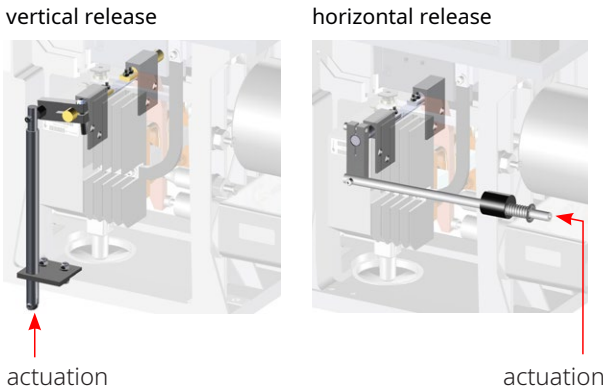




MANUAL RELEASE

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



/// FOR UR60/80

DESIGNATION CODE FOR ORDERING

- 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 alphanumerical designation code with 22 characters when placing your order.
- The customer shall write down the setting of maximum current release value (Id) 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.

Example of customer's choice:	**UR**	**26**	**81**	**-**	1	E	E	0	F	0	A	C	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

Line	Description	Designation	Standard	Options	Customer's choice
10	Breaker type	**UR**	**UR**		**UR**
11	Conventional free air thermal current	2'600 A	**26**		
		4'000 A	**40**		
		4'600 A	**46**		
		6'000 A	**60**		
		8'000 A	**80**		
12	Rated operational voltage	900 V	**81**		
		1'800 V	**82**		
		3'600 V	**64**		
13	Application	Industry	**-**		-
14	Arc chute installation				
	For UR26/40/46 Arc chute 81/82				
	and UR60/80 Arc chute 82	Opening on LV connector side	1		
	For UR26/40 Arc chute 64	Type SE	2		
	For UR60/80 Arc chute 81	Vertical removal	8		
15	Control type	Electric holding - without ECO-Drive	E		
		Magnetic holding - without ECO-Drive		M	
		Electric holding - with ECO-Drive [4]		4	
16	Nominal control voltage				
	For UR26/40/46	24 V_{DC}	A		
	For UR26/40/46/60/80	48 V_{DC}	O		
	For UR26/40/46/60/80	110 V_{DC}	E		
	For UR26/40/46/60/80	125 V_{DC}	R		
	For UR26/40/46/60/80	220 V_{DC}	J		
17	Varistor on coil [2]:	No	Ø		
		Yes (battery voltage)		1	
18	Direct over-current release (bi-directional)				
	For UR26	1.4 - 2.7 kA	A		
	For UR26/40/46	2.0 - 8.0 kA	D		
	For UR40/46	4.0 - 15.0 kA	F		
	For UR60	13.0 - 18.0 kA	L		
	For UR80	16.0 - 24.0 kA	P		
		For other selection, refer to codification table page 5		....	
19	Indirect release (shunt trip)	No	Ø		
	For UR26/40/46 (includes horizontal manual release)	BIM5		5	
	For UR26/40/46 (includes horizontal manual release)	BIM6		7	
	For UR60/80 (includes horizontal manual release)	BIM7		4	
	For UR60/80 (includes horizontal manual release)	BIM8		6	
20	Auxiliary contacts				
	For UR26/36/40/46/60/80 5a + 5b -	(switch PF)	A		
	For UR26/40/46 5a + 5b -	(switch CO)		B	
21	LV connector type on circuit-breaker				
	For UR26/40/46/60/80	Harting type HAN® 32 EE	O		
22	Manual release	No	Ø		
	For UR26/40/46/60/80	Horizontal		1	
	For UR26/40/46/60/80	Vertical		2	
23	Manual closing device (not compatible with line 25 nor 26)	No	Ø		
	For UR26/40/46/60/80	Yes		3	
24	Position indicator	No	Ø		
	For UR26/40/46	Yes		2	
25	Overcurrent release detector (not compatible with line 23 nor 26)	No	Ø		
	For UR26/40/46	Yes		1	
26	Contact wear indicator (not compatible with line 23 nor 25)	No	Ø		
	For UR26/40/46	Yes		1	
27	HV main connections (according to pages 7 and 8)	Standard	S		S
28	Digit for Sécheron internal purpose				
	For UR26/40	Arc chute 64	A		
	For UR26/40/46	Arc chute 81	B		
	For UR26/40/46	Arc chute 82	C		
	For UR60/80	Arc chute 81 & 82	L		

[1] ECO-Drive is only available for UR26/40/46 with Harting HAN® 32 connector and for 110VDC 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 HAN® 32 EE: ☐ SG104063R10100

Value of the setting of the direct over-current release: .....[A]

Signature:

Name:

Place and date:

Sécheron SA
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