

**Erection
and
maintenance
instructions**

Rev B1

Indoor vacuum circuit breaker for railway applications

GSR 5924

27.5 kV - 200 kV BIL - 2000 A - 25.0 kA - 50/60 Hz

Single-pole vacuum circuit breaker with spring-charge
mechanism

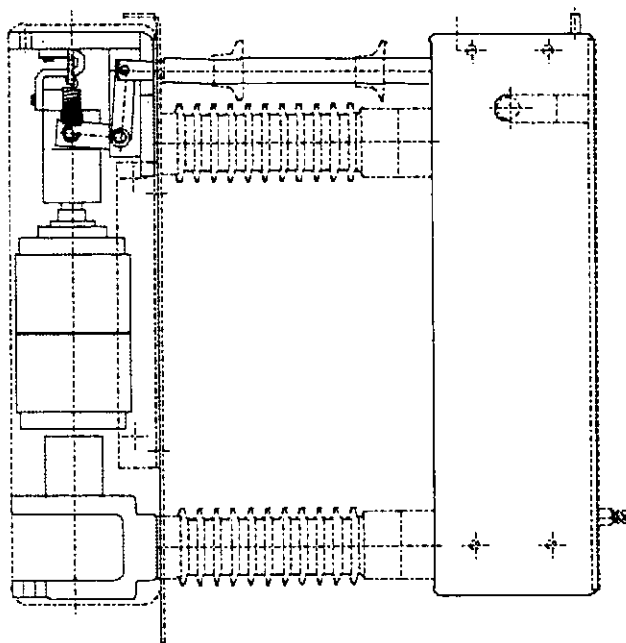


ABB Power Distribution



Table of content

1	FOREWORD.....	3
2	TRANSPORT AND STORAGE.....	3
3	BEFORE COMMISSIONING.....	4
4	COMMISSIONING THE CIRCUIT BREAKER	4
5	MAINTENANCE PROGRAM.....	5
5.1	MAINTENANCE PROGRAM	6
6	INSPECTION PROCEDURE.....	6
6.1	PREPARATION.....	6
6.2	HIGH VOLTAGE PARTS.....	6
6.3	CONTACTS WEAR MEASUREMENT	7
7	CONTROL MECHANISM.....	7
7.1	DETAILS ON CONTROL MECHANISM GSR.0521	8
7.2	GREASING THE ECCENTRIC ROLLER.....	9
8	RECOMMENDED SPARE PARTS LIST.....	10
9	APPENDIX A - OUTLINE DRAWING - GSR 5924.....	11
10	APPENDIX B - CIRCUIT DIAGRAM.....	12
11	APPENDIX C - ELECTRICAL LIFE SPAN - GSR 5924.....	13

B1	E	17.10.00	Xiamen TOT	SL	PhH	PhH
B	E	16.10.00	Review	GG	PhH	PhH
0	E	15.06.99	Emission	SL	PhH	PhH
Revision	Version	Date	Status	By	Checked	Approved

1 Foreword

Present instructions are applicable to the circuit breaker manufactured by ABB Xiamen in the frame of the Transfer Of Technology agreement between ABB Xiamen PR China and ABB Sécheron Geneva, Switzerland

2 Transport and storage

The circuit breaker is transported tighten on a wooden support, the pole being supported in order to prevent stress on the insulators.

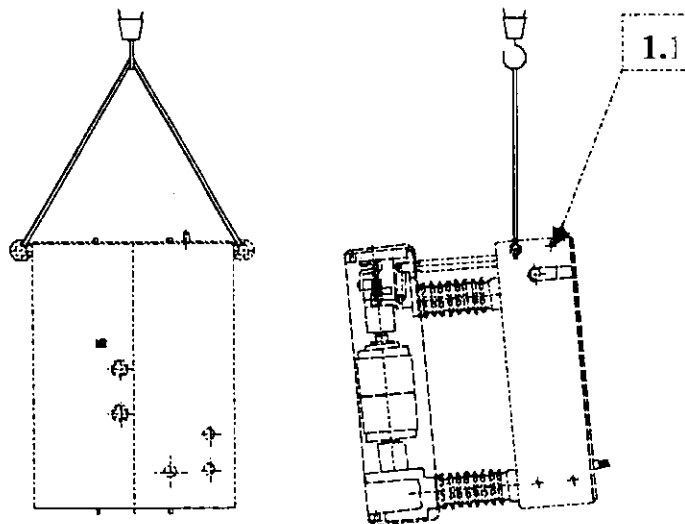


The equipment shall be handled with care

The circuit breaker shall be stored **indoor** in upright position, **contact open (position OFF)**, in a dry, dust free room.

Take all necessary measures to avoid moisture condensation in the control box during storage or operation.

Use slings (or other lifting device) to lift up and displace the circuit breaker, as shown below:



Lifting the breaker (Weight ? 115 kg)

3 Before commissioning

Check on the circuit breaker before inserting the cassette in the cubicle:

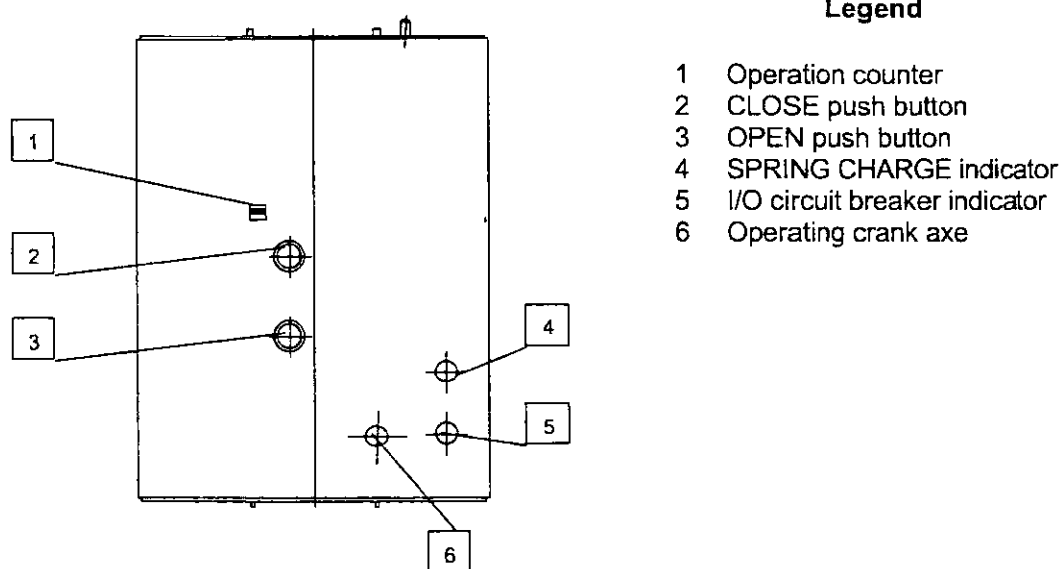
- ✘ Support insulator: in good condition and clean (dust free).
- ✘ Vacuum interrupter: in good condition and clean.
- ✘ The schematic diagram number is according to the rating plate.
- ✘ Manual cranks for spring operation is available.
- ✘ The auxiliary voltage for coils and motors indicated on the rating plate corresponds to the installation auxiliary supply.

4 Commissioning the circuit breaker

The circuit breaker is controlled and adjusted in factory and ready for operation. Before the inserting the cassette, operate manually the circuit breaker:

- ✘ Tighten the closing spring with the circuit breaker crank (turn clockwise about one turn until the spring is CHARGED (indicator Pos. 4 shown below)
- ✘ Close the circuit breaker with "I" Close push button (Pos. 2 shown below)
- ✘ Tripped the circuit breaker with "O" OPEN push-button (Pos. 3 shown below)

Repeat the manual operation a few times



GSR 5924 front cover

See switchgear operating instruction for cassette operation, commissioning and interlocking details.

Installation on cassette



Check that the circuit breaker contacts are in open OFF position and completely release the springs before inserting the cassette (carry on I/O operations without rewinding the spring)

Insert the cassette and repeat the manual check of the circuit breaker. Please refer to switchgear manual for switchgear commissioning instructions.

5 Maintenance program

The circuit breaker has been designed for a life span of 20 000 mechanical operations. Its operating mechanism requires little maintenance. Vacuum interrupters are maintenance free during their lifetime.

Metallic or insulated material parts do not require maintenance. However, the insulators and insulated materials parts, particularly in dusty or polluted environment must be periodically cleaned with a soft dry cloth.

The ball bearings and knee joints are lubricated for life; they do not need lubrication for about twenty years under normal operation conditions. However in case of operation at high or very low temperature, or with a very high operation rate, lubrication might be requested. Please ask for special instructions.

As regards vacuum level, the guaranteed life expectancy of the interrupter is 20 years. In practice, the wear of the contacts defines the interrupter actual operating life



Apart from possible replacement of the interrupter referred further on as operation B, no parts replacement is foreseen as routine maintenance.

Only when failures occur during operations or when defaults are detected during maintenance operation A and B, repairs and parts replacement have to be carried out by authorised personal

5.1 Maintenance program

Operation Reference	Name	Intervals	Remarks	Estimated Duration	Spare parts / Consumable / Special tools
A	Inspection	Once a year Or After 1000 operations.	Including wear of contact control	30 '	See description (Spray / Ball bearing grease)
B	Interrupter Replacement	Depends on: see Contact wear limit see Sum current limit	Authorised and trained personal only Not documented in this manual	120 '	Spare part Interrupter

6 Inspection procedure

6.1 Preparation

- ~~see~~ Completely withdraw the cassette from the cubicle.
- ~~see~~ Perform open-close operations without auxiliary power to completely release the springs
- ~~see~~ Remove the front cover.

6.2 High voltage parts

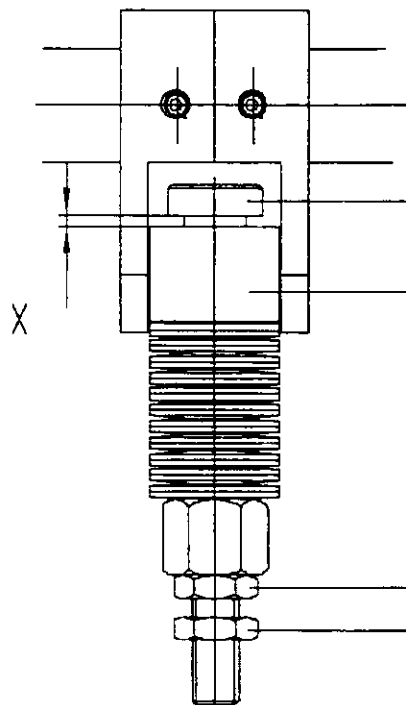
Proceed to controls listed below:

- ~~see~~ Cleanliness of the insulating parts
- ~~see~~ No mark of overheating on the conducting parts
- ~~see~~ Bolts and nuts tightness
- ~~see~~ Contact wear (see instructions below)
- ~~see~~ Interrupting chamber integrity

When a damage is suspected, the vacuum integrity of the interrupter shall be controlled with an electronic vacuum controller

6.3 Contacts wear measurement

The wear of contact depends on the operation conditions and on the cumulated value of interrupted current. (see curve appendix C).



The X distance is factory adjusted to 4mm. (Corresponding to 3 mm in the contact stroke)

The minimum X value before replacement is 0.5 mm

No adjustment during lifetime of the interrupter is requested

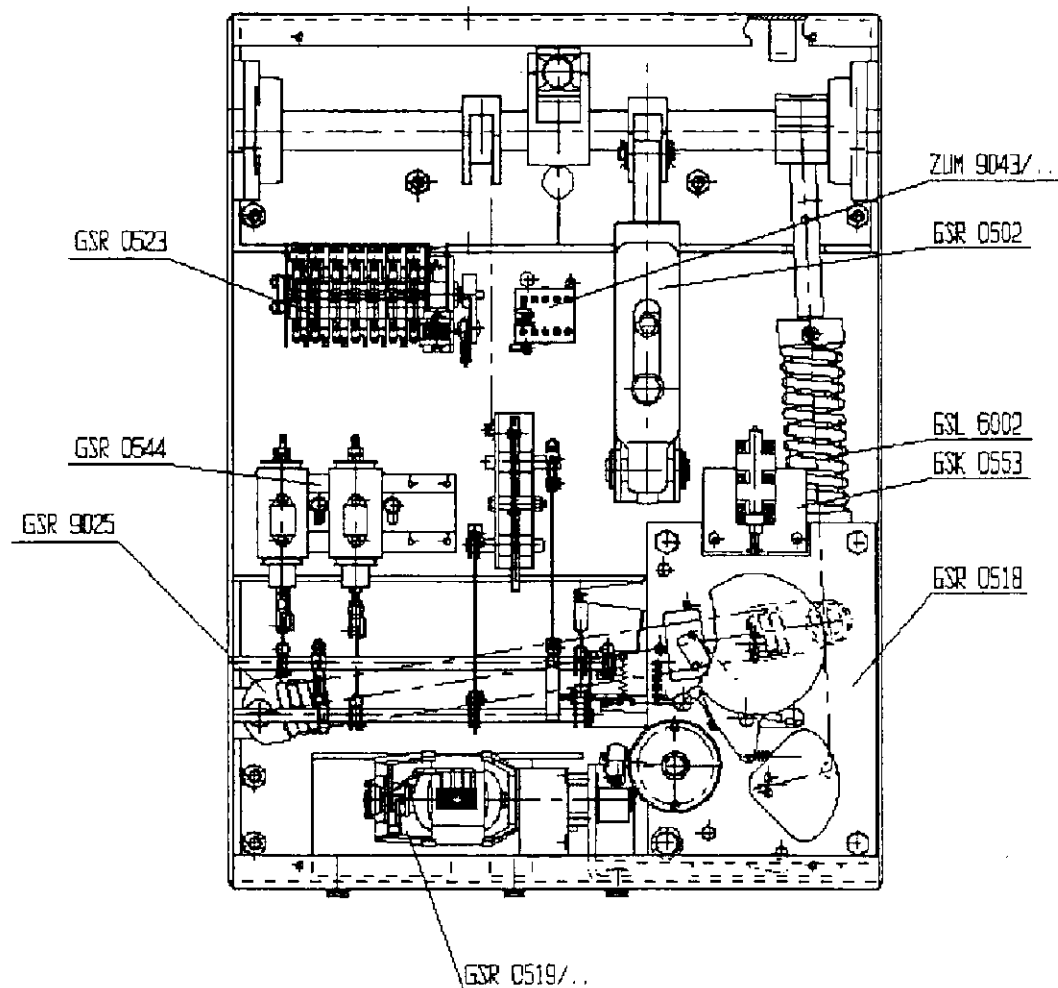
When the minimum X value 0.5 mm is reached, the interrupter should be replaced.

7 Control mechanism

Proceed to controls listed below:

- ✂ Visual control and overall cleanliness of the control mechanism
- ✂ Control wiring and terminal tightness
- ✂ Switches inspection (no contact smelting should appear)
- ✂ Control the close and open coils operating rods and coils cores (they should move freely)
- ✂ Control and **greasing** of the eccentric roller of the closing spring rewind motor with ball gearing grease (see instructions below)
- ✂ Carry out several operations of the circuit breaker and control the interlocks

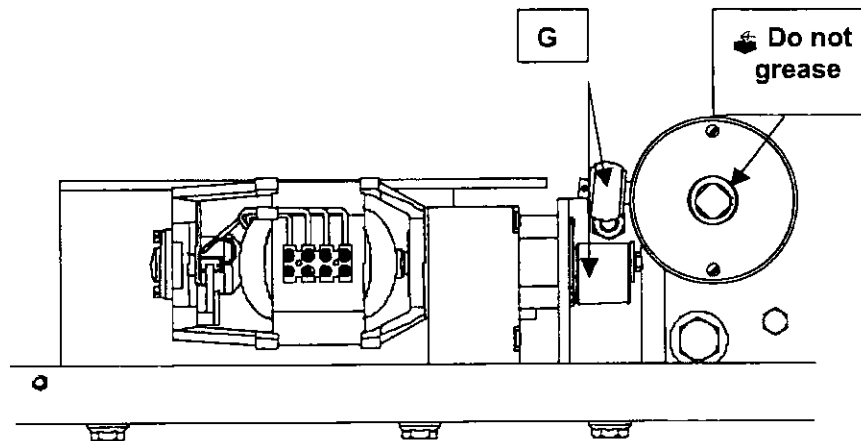
7.1 Details on control mechanism GSR.0521



Legend

GSR.0502	Shock damper
GSR.0544	Coil assembly
GSR.0523	Auxiliary switch and counter assembly
GSR.0519	Motor assembly
GSR.0518	Mechanical control unit
GSR.9025	Closing spring
GSL.6002	Opening spring
GSK.0553	Motor end switch assembly
ZUM.9043	Anti-pumping relay

7.2 Greasing the eccentric roller



Greasing the eccentric roller

It is possible to use a spray to clean the control mechanism except for the rewinding axis of the closing spring (🔧) (Spray type WD 40 or equivalent silicon spray)



NEVER PUT GREASE OR OIL IN THE MOBILE CONTACT GUIDE OF THE VACUUM INTERRUPTER CHAMBER

After completion of the control, the steel cover is fixed back and the circuit breaker cassette inserted in the panel.

8 Recommended spare parts list

Qty	Part	Reference
1	Vacuum interrupter	ZUL.9038.00
1	Insulated rod	GSR.9038.00
1	Closing spring	GSR.9025.00
1	Opening spring	GSL.6002.00
1	Auxiliary switch with counter	GSR.0523
1	Operating coil assembly	GSR.0544
1	Flexible conductor	FSK.9079.00
1	Motor assembly	GSK.0519
1	Motor end travel switch	GSK.0602
1	Anti-pumping relay	ZUM.9043.00
1	Insulator	GSR.8515.00

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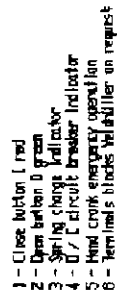
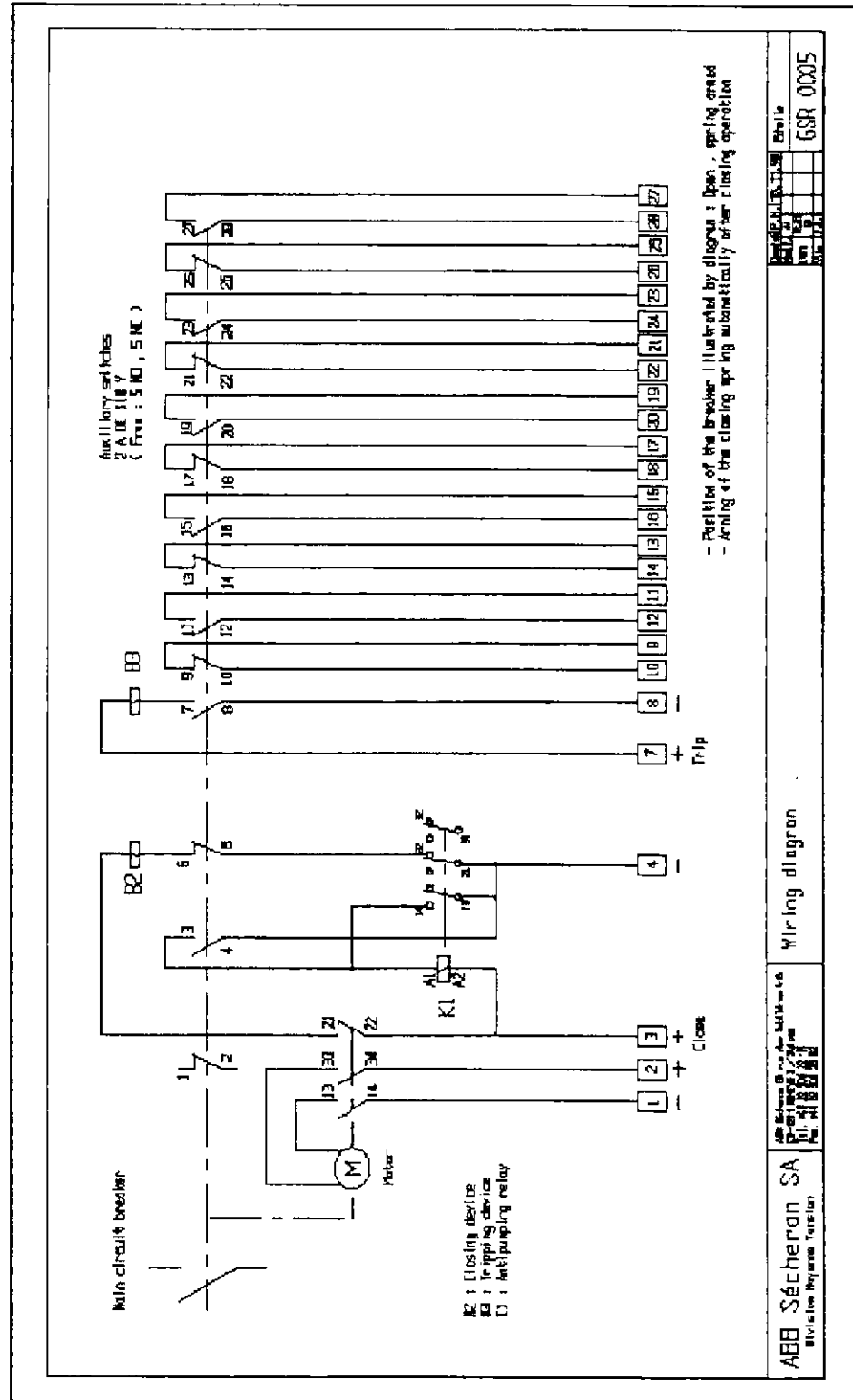


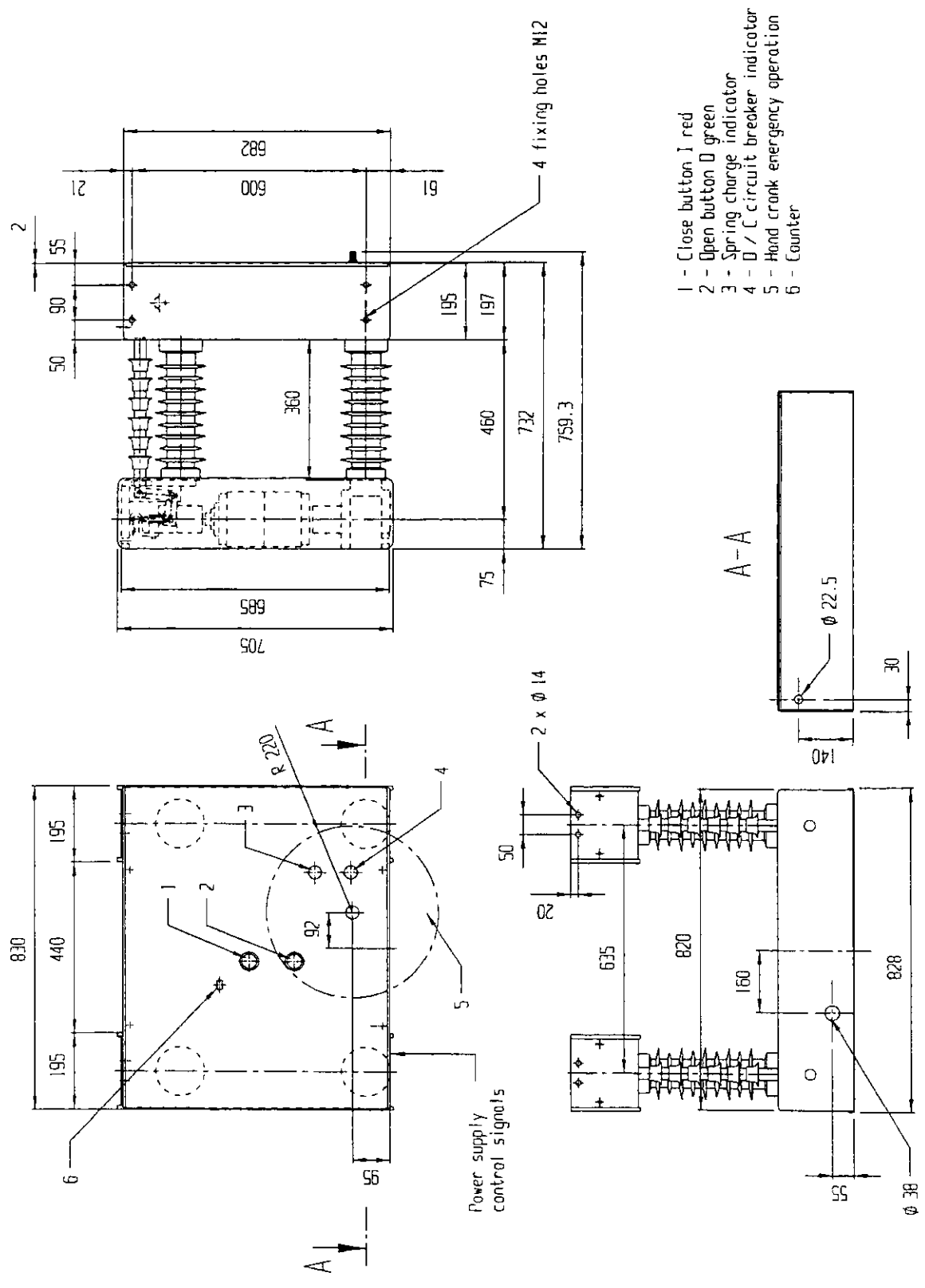
ABB Sécheron SA Division Moyenne Tension	ABB Sécheron SA 21, rue de la République F-91010 Evry-Courcouronnes	Single phase fixed indoor vacuum circuit breaker	<table border="1"> <tr> <td>Model</td> <td>1600</td> <td>1600</td> <td>1600</td> <td>1600</td> </tr> <tr> <td>Rating</td> <td>1600</td> <td>1600</td> <td>1600</td> <td>1600</td> </tr> <tr> <td>Current</td> <td>1600</td> <td>1600</td> <td>1600</td> <td>1600</td> </tr> <tr> <td>Voltage</td> <td>1600</td> <td>1600</td> <td>1600</td> <td>1600</td> </tr> </table>	Model	1600	1600	1600	1600	Rating	1600	1600	1600	1600	Current	1600	1600	1600	1600	Voltage	1600	1600	1600	1600	<table border="1"> <tr> <td>Model</td> <td>1600</td> <td>1600</td> <td>1600</td> <td>1600</td> </tr> <tr> <td>Rating</td> <td>1600</td> <td>1600</td> <td>1600</td> <td>1600</td> </tr> <tr> <td>Current</td> <td>1600</td> <td>1600</td> <td>1600</td> <td>1600</td> </tr> <tr> <td>Voltage</td> <td>1600</td> <td>1600</td> <td>1600</td> <td>1600</td> </tr> </table>	Model	1600	1600	1600	1600	Rating	1600	1600	1600	1600	Current	1600	1600	1600	1600	Voltage	1600	1600	1600	1600
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10 Appendix B - Circuit diagram



1 Technical data GSR 5928

Rated frequency	50 Hz
Rated nominal operation voltage	27.5 kV
Number of phase	2
Power frequency withstand voltage (50 Hz – 1 min)	
– Between opened contacts	110 kV
– Phase to earth	95 kV
– Between phases	95 kV
Lightning impulse withstand voltage (1.2/50 µs)	
– Between opened contacts	250 kV
– Phase to earth	200 kV
– Between phases	250 kV
Rated continuous current	2500 A
Rated short-circuit breaking current	25 kA
Rated short-circuit making current	63 kA
Rated short-time withstand current (3 s)	25 kA
Opening time	≤ 50 ms
Closing time	≤ 100 ms
Rated operating sequence	O – 0.3 s – CO – 180s – CO
Standard applied	EN 50152-1, IEC 694
Operating temperature range	- 5 / +40° C
Storage temperature range	- 20 / + 45 °C
Altitude	≤ 1000 m
Auxiliary supply	60 V DC
<u>Reference drawings</u>	
Two-phase circuit breaker GSR5928	1VSR 74 5928 C0001
Wiring diagram	1VSR 74 0029 S 0001



- 1 - Close button I red
- 2 - Open button D green
- 3 - Spring charge indicator
- 4 - D / C circuit breaker indicator
- 5 - Hand crank emergency operation
- 6 - Counter

ABB Sécheron SA Division Moyenne Tension	2 phases fixed indoor vacuum circuit breaker 25 kV - 50 Hz - 2500 A - 25kA - 200/250kV BIL	Only for information	Echelle 1 : 10 IYSR745928C0001
ABB Sécheron SA rue des Sublimes 4-6 CH 1211 GENEVE 2 / Suisse Tel. 44 22 306 22 11 Fax 44 22 306 26 82	Design P.H. 01.10.03 Modif. 01.10.03 Date 05.2003 Visé P.H. A.B. A.B.	2 phases fixed indoor vacuum circuit breaker 25 kV - 50 Hz - 2500 A - 25kA - 200/250kV BIL	Echelle 1 : 10 IYSR745928C0001

- Arming of the closing spring automatically after closing operation

- Position of the breaker illustrated by diagram "Closing spring armed"

B2 : Closing coil
B3 : Tripping coil
B3' : Tripping coil
K2 : Antipumping relay
SI : Electrical indicator
"Spring armed"

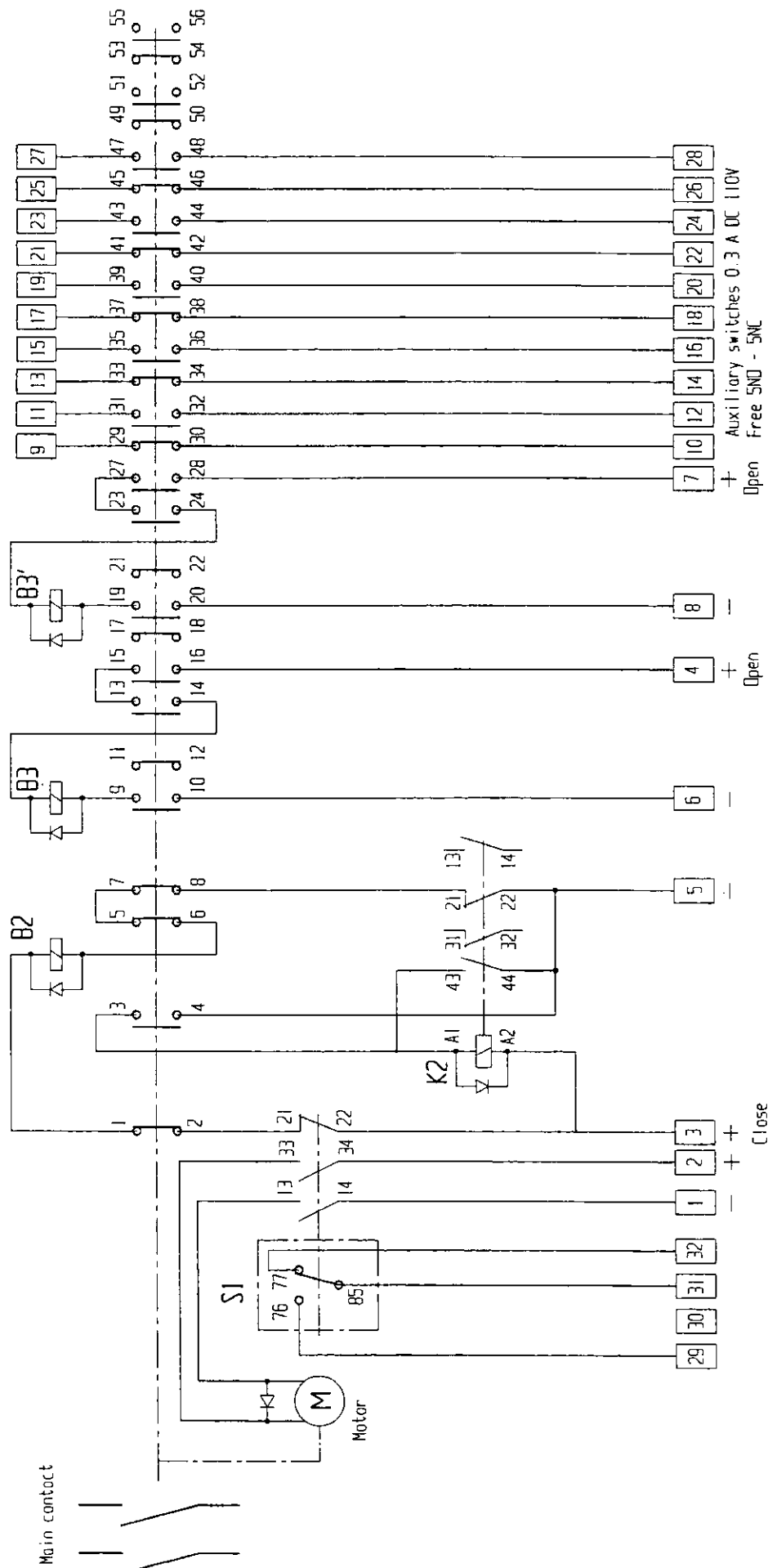


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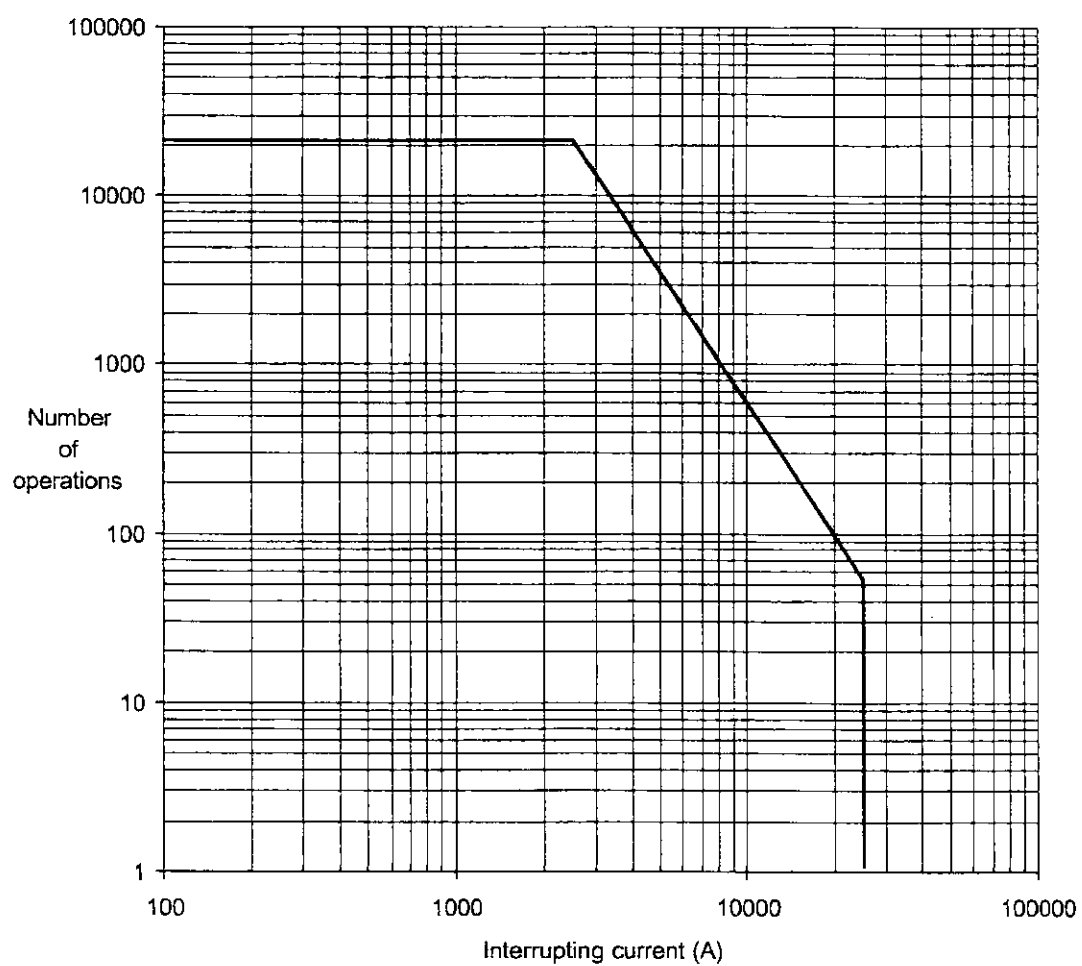
Wiring diagram for circuit breaker

Only for information

Modif.	A.B.	24.10.03	Echelle	-	-
Date	2003				
Y150	A.B.				

1V3R 740029 S 0001

11 Appendix C - Electrical life span - GSR 5924



Vacuum interrupter technical data