



Test Report issued under the responsibility of:



TEST REPORT
IEC 60947-4-1
Contactors and motor-starters
Electromechanical contactors and motor-starters

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CB Testing Laboratory : UL INTERNATIONAL DEMKO A/S

Address : Borupvang 5A, 2750 Ballerup, Denmark

Applicant's name : LSIS Co., Ltd.

Address : CHEONG JU PLANT 1, Song Jung-Dong, Hung Duk-Ku, Cheong Ju-Shi, Chung Cheong Buk-Do, 361-720, Korea

Test specification:

Standard : IEC 60947-4-1:2009 (3rd Edition)

Test procedure : CB Scheme

Non-standard test method : N/A

Test Report Form No. : IEC60947_4_1A

Test Report Form(s) Originator : KEMA Quality BV

Master TRF : Dated 2010-01

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Test item description : Magnetic Contactors

Trade Mark : LS

Manufacturer : LSIS Co., Ltd.

CHEONG JU PLANT 1, Song Jung-Dong, Hung Duk-Ku, Cheong Ju-Shi, Chung Cheong Buk-Do, 361-720, Korea

Model/Type reference : GMC-6M, GMC-6M/4, GMC-6MF, GMC-6MF/4, GMC-6MP, GMC-6MP/4, GMC-6MC, GMC-6MC/4
 GMD-6M, GMD-6M/4, GMD-6MF, GMD-6MF/4, GMD-6MP, GMD-6MP/4, GMD-6MC, GMD-6MC/4
 GMC-6MR, GMD-6MR
 GMC-9M, GMC-9M/4, GMC-9MF, GMC-9MF/4, GMC-9MP, GMC-9MP/4, GMC-9MC, GMC-9MC/4
 GMD-9M, GMD-9M/4, GMD-9MF, GMD-9MF/4, GMD-9MP, GMD-9MP/4, GMD-9MC, GMD-9MC/4
 GMC-9MR, GMD-9MR
 GMC-12M, GMC-12M/4, GMC-12MF, GMC-12MF/4, GMC-12MP, GMC-12MP/4, GMC-12MC, GMC-12MC/4
 GMD-12M, GMD-12M/4, GMD-12MF, GMD-12MF/4, GMD-12MP, GMD-12MP/4, GMD-12MC, GMD-12MC/4
 GMC-12MR, GMD-12MR
 GMC-16M, GMC-16M/4, GMC-16MF, GMC-16MF/4, GMC-16MP, GMC-16MP/4, GMC-16MC, GMC-16MC/4
 GMD-16M, GMD-16M/4, GMD-16MF, GMD-16MF/4, GMD-16MP, GMD-16MP/4, GMD-16MC, GMD-16MC/4
 GMC-16MR, GMD-16MR
 See model nomenclature in general product information

Ratings : See the rating table below

Rating Table for Magnetic Contactor ;

Type		GMC-6M	GMC-9M	GMC-12M	GMC-16M
I_{th} (AC1)		20	20	20	20
Short-circuit current (690V)		1kA	1kA	1kA	1kA/3kA *1
SCPD (Fuse)		gL-gG 20A	gL-gG 20A	gL-gG 20A	gL-gG 20A
AC-2	200-240V	7A	9A	12A	18A
	380-440V	6A	9A	12A	16A
	500-550V	5A	6A	7A	9A
	690V	4A	5A	5A	5A
AC-3	200-240V	7A	9A	12A	18A
	380-440V	6A	9A	12A	16A
	500-550V	5A	6A	7A	9A
	690V	4A	5A	5A	5A
AC-4	200-240V	6A	9A	9A	12A
	380-440V	6A	9A	9A	11A

1) 1kA for all ratings except 3 kA for AC-3 at 200-240 Vac with 18 A and 3 kA for AC-2 at 200-240 Vac with 18 A.

2) AC-4 : Reversing contactors.

3) Rating in the following models in details:

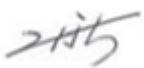
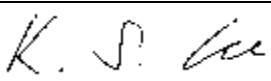

- GMC-6M is identical with GMC-6M/4, GMC-6MF, GMC-6MF/4, GMC-6MP, GMC-6MP/4, GMC-6MC, GMC-6MC/4, GMD-6M, GMD-6M/4, GMD-6MF, GMD-6MF/4, GMD-6MP, GMD-6MP/4, GMD-6MC, GMD-6MC/4, GMC-6MR, GMD-6MR

- GMC-9M is identical with GMC-9M/4, GMC-9MF, GMC-9MF/4, GMC-9MP, GMC-9MP/4, GMC-9MC, GMC-9MC/4, GMD-9M, GMD-9M/4, GMD-9MF, GMD-9MF/4, GMD-9MP, GMD-9MP/4, GMD-9MC, GMD-9MC/4, GMC-9MR, GMD-9MR
- GMC-12M is identical with GMC-12M/4, GMC-12MF, GMC-12MF/4, GMC-12MP, GMC-12MP/4, GMC-12MC, GMC-12MC/4, GMD-12M, GMD-12M/4, GMD-12MF, GMD-12MF/4, GMD-12MP, GMD-12MP/4, GMD-12MC, GMD-12MC/4, GMC-12MR, GMD-12MR
- GMC-16M is identical with GMC-16M/4, GMC-16MF, GMC-16MF/4, GMC-16MP, GMC-16MP/4, GMC-16MC, GMC-16MC/4, GMD-16M, GMD-16M/4, GMD-16MF, GMD-16MF/4, GMD-16MP, GMD-16MP/4, GMD-16MC, GMD-16MC/4, GMC-16MR, GMD-16MR

4) U_i : 690 V, U_{imp} : 6 kV

Rating Table of the Auxiliary contact : Short circuit current – 1 kA

Auxiliary, AC	AC-15	I_{th}	Auxiliary, DC	DC-13	I_{th}
120V	6	10A	125V	0.55	2.5A
240V	3		250V	0.27	
380V	1.9		400V	0.15	
480V	1.5		500V	0.13	
500V	1.4		600V	0.1	
600V	1.2				

Testing procedure and testing location:		
<input type="checkbox"/>	CB Testing Laboratory:	N/A
Testing location/ address		
<input type="checkbox"/>	Associated CB Laboratory:	N/A
Testing location/ address		N/A
Tested by (name + signature)		N/A
Approved by (+ signature)		N/A
<input type="checkbox"/>	Testing procedure: TMP	N/A
Testing location/ address		N/A
Tested by (name + signature)		N/A
Approved by (+ signature)		N/A
<input checked="" type="checkbox"/>	Testing procedure: WMT	LSIS Co., Ltd.
Testing location/ address		CHEONG JU PLANT 1, Song Jung-Dong, Hung Duk-Ku, Cheong Ju-Shi, Chung Cheong Buk-Do, 361-720, Korea
Tested by (name + signature) :		Jae-Kyu Park 
Witnessed by (+ signature) :		KangSik Lee 
Approved by (+ signature) :		S. Chandrakumar 
<input type="checkbox"/>	Testing procedure: SMT	N/A
Testing location/ address		N/A
Tested by (name + signature)		N/A
Approved by (+ signature)		N/A
Supervised by (+ signature)		N/A
<input type="checkbox"/>	Testing procedure: RMT	N/A
Testing location/ address		N/A
Tested by (name + signature)		N/A
Approved by (+ signature)		N/A
Supervised by (+ signature)		N/A

Summary of testing: IEC 60947-4-1: 2009 / IEC 60947-1:2007

The following test / clauses have been conducted under WMT program

Tests performed (name of test and test clause):

Test sequence 1

- (i) Verification of temperature rise (see 9.3.3.3)
- (ii) Verification of operation and operating limits
(see 9.3.3.1 and 9.3.3.2)
- (iii) Verification of dielectric properties (see 9.3.3.4)

Test sequence 2

- (i) Verification of rated making and breaking capacities,
change-over ability and reversibility, where applicable
(see 9.3.3.5)
- (ii) Verification conventional operating performance
(see 9.3.3.6)

Test sequence 3

Performance under short-circuit conditions (see 9.3.4)

Test sequence 4

Verification of ability to withstand overload currents
(see 9.3.5)

Test sequence 5

- (i) Verification of mechanical properties of terminals (see
8.2.4 of part 1);
- (ii) Verification of degrees of protection of enclosed
contactors and starters (see Annex C of IEC 60947-1)

Others : Glow Wire Test

Testing location:

LSIS Co., LTD.

Summary of Testing

Seq	Tests performed	GMC				Remark
		6M	9M	12M	16M	
I	1) Verification of temperature rise(see 9.3.3.3)	○	N/A	N/A	N/A	GMC-6M with AC coil at 550 V & GMD-6M with DC Coil at 240 V
	2) Verification of operation and operating limits(see 9.3.3.1 and 9.3.3.2)					GMD-6MC with DC coil at 240 V & GMD-6MP with DC coil at 240 V
	3) Verification of dielectric properties(see 9.3.3.4)					GMD-6MP with DC coil at 240 V
II	1) Verification of rated making and breaking capacities, change-over ability and reversibility, where applicable(see 9.3.3.5)	○	N/A	○	○	See Sequence II table below
	2) Verification conventional operating performance(see 9.3.3.6)	○	N/A	○	○	
III	1) Performance under short-circuit conditions(see 9.3.4)	○	N/A	N/A	○	GMC-6M, GMC-6MF, GMC-16M, GMD-6MC, GMD-6MP
IV	1) Verification of ability to withstand overload currents (see 9.3.5)	○	N/A	○	○	GMC-6M, GMD-6MP, GMC-12M, GMC-16M, GMD-6MC, GMC-6MF
V	1) Verification of mechanical properties of terminals (see 8.2.4 of part 1)	○	N/A	N/A	N/A	GMD-6M, GMD-6MC, GMC-6MF
	2) Verification of degrees of protection of enclosed contactors and starters (see Annex C of IEC 60947-1) - IP20	○	N/A	N/A	N/A	GMC-6M
Others	Glow Wire Test	○	N/A	N/A	N/A	GMC-6M

Sequence II-1 table

Rating		GMC-6M		GMC-9M		GMC-12M		GMC-16M		Remark
		A	VA	A	VA	A	VA	A	VA	
AC-3	220-240V	7	1,680	9	2,160	12	2,880	18	4,320	Bolded values are different from KEMA Certification Rating - AC-3 of GMC-16M, 220~240V: KEMA 16A -> 18A - AC-4 of GMC-9M, 220~240V: KEMA 8A -> 9A - AC-4 of GMC-9M, 380~440V: KEMA 6A -> 9A AC-4 of GMC-12M 220~240V: KEMA 11A -> 9A AC-4 of GMC-12M 380~440V: KEMA 8A -> 9A
	380-440V	6	2,640	9	3,960	12	5,280	16	7,040	
	500-550V	5	2,750	6	3,300	7	3,850	9	4,950	
	690V	4	2,760	5	3,450	5	3,450	5	3,450	
AC-4	220-240V	6	1,440	9	2,160	9	2,160	12	2,880	
	380-440V	6	2,640	9	3,960	9	3,960	11	4,840	

Make condition of Sequence II-2 table

Rating		GMC-6M		GMC-9M		GMC-12M		GMC-16M		Remark
		A	VA	A	VA	A	VA	A	VA	
AC-3	200-240V	70	16,800	90	21,600	120	28,800	180	43,200	Bolded values are maximum voltage, maximum current and maximum VA
	380-440V	60	26,400	90	39,600	120	52,800	160	70,400	
	500-550V	50	27,500	60	33,000	70	38,500	90	49,500	
	690V	40	27,600	50	34,500	50	34,500	50	34,500	
AC-4	200-240V	72	7,280	108	25,920	108	25,920	144	34,560	
	380-440V	72	31,680	108	47,520	108	47,520	132	58,080	

Make and Break condition of Sequence II-3 table

Rating		GMC-6M		GMC-9M		GMC-12M		GMC-16M		Remark
		A	VA	A	VA	A	VA	A	VA	
AC-3	200-240V	56	13,440	72	17,280	96	23,040	144	34,560	Bolded values are maximum voltage, maximum current and maximum VA
	380-440V	48	21,120	72	31,680	96	42,240	128	56,320	
	500-550V	40	22,000	48	26,400	56	30,800	72	39,600	
	690V	32	22,080	40	27,600	40	27,600	40	27,600	
AC-4	200-240V	60	14,400	90	21,600	90	21,600	120	28,800	
	380-440V	60	26,400	90	39,600	90	39,600	110	48,400	

Conventional operational condition of Sequence II-4 table

Rating		GMC-6M		GMC-9M		GMC-12M		GMC-16M		Remark
		A	VA	A	VA	A	VA	A	VA	
AC-3	200-240V	14	3,360	18	4,320	24	5,760	36	8,640	Bolded values are maximum voltage, maximum current and maximum VA
	380-440V	12	5,280	18	7,920	24	10,560	32	14,080	
	500-550V	10	5,500	12	6,600	14	7,700	18	9,900	
	690V	8	5,520	10	6,900	10	6,900	10	6,900	
AC-4	200-240V	36	8,640	54	12,960	54	12,960	72	17,280	
	380-440V	36	15,840	54	23,760	54	23,760	66	29,040	

Additional Information

Test Sequence 1 - lth rating (Main: 20A, Auxiliary: 10A) is same for all models. Sequence I was done with following models because it has smallest contact size.

- GMC-6M with 550 Vac coil,
- GMD-6M with 240 Vdc coil,
- GMD-6MF with 240 Vdc coil,
- GMD-6MC with 240 Vdc coil,
- GMD-6MP with 240 Vdc coil

Test Sequence 2 - GMC-9M and GMC-12M have same contact size. Therefore, testing with GMC-12M covers GMC-9M. Representative samples were selected according to the maximum voltage, maximum current and maximum VA.

Test Sequence 3 - Short circuit current - 1kA for most models except GMC-16M with 3 kA for AC2 at 200-240 Vac with 18 A and 3 kA for AC3 at 200-240 Vac with 18 A.

(Seq. III will be done with GMC-6M, GMC-6MF, GMD-6MC and GMD-6MP because it has smallest contact size except GMC-16M with 3 kA at 200-240 Vac with 18 A and 200-240 Vac with 18 A)

Test Sequence 4 - GMC-9M and GMC-12M has same contact size. Testing was done with GMC-6M, GMC-6MF, GMD-6MC, GMD-6MP, GMC-12M, GMC-16M.

Test Sequence 5 - Terminal is same for all models.

Glow Wire Test – Testing was done with GMC-6M and the materials are same for all other models.

General information

1. Wire size for main terminals: Stranded, 18-12 AWG.
2. Auxiliary contact will be tested with GMR-4M according to the IEC-60947-5-1
(Utilization Category : AC-15, DC-13 (A600, Q600))
3. Sequence II was tested according to Reversing type
(Forward -> Backward -> 10 cycles additional test for reversing type simultaneously)
4. See coil VA consumption table for selection of maximum VA.

Coil VA : Bolded are maximum VA.

AC	Voltage	24	36	42	48	110	115	120	127	208
	Coil Current (mA)	242	161	138	121	53	50	48	46	29
	VA	5.81	5.80	5.80	5.81	5.83	5.75	5.76	5.84	6.03
DC	Voltage	12	20	24	36	42	48	60	72	110
	Coil Resistance (Ohm)	52	144	207	466	635	829	1,295	1,865	4,354
	W	2.77	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78

220	230	240	256	277	400	440	480	500	550
26	26	25	23	21	15	13	12	12	11
5.72	5.98	6.00	5.89	5.82	6.00	5.72	5.76	6.00	6.05
120	125	220	240	250					
5,152	5,346	16,957	17,858	19,397					
2.80	2.92	2.85	3.23	3.22					

N/A : Not applicable

Annexure

- Annexure 1 : Photographs (Pictures of the products - Assembled)
 Annexure 2 : Photographs (Pictures of the products - Disassembled)
 Annexure 3 : Oscillograms (Clause 8.3.4 : Performance under conditional short-circuit current)
 Annexure 4 : Clause 8.3.4 : Performance under conditional short-circuit current.
 (Enclosure and fusible element wire details)
 Annexure 5 : Installation Instructions or manufacturer published literature
 Annexure 6 : Product / Component Drawings

Summary of compliance with National Differences : N/A

Copy of marking plate :

LS CONTACTOR 교류전자계測기(접속기)
GMC(D)-6M

HJ02004-6002
220V 7A, 440V 6A

CE 6721 IND.CONF.EQ.

V AC 120 240 480 600
1PH.HP 0.5 1 3 3
3PH.HP 1.5 3 3 3

K60947-4-1 IEC60947
BS5424 VDE0660
AC V 230 400 690

AC3 kW 1.5 2.2 3
A 7 6 4
AC15 A 6 3 1

Continuous current: 20A
When protected by 20A time
delay fuses. Short circuit 5kA
RMS Sym., 600V Max.
AWG12-18 60/75°C-Cu wire only
Torque: 7lb.in(0.8Nm)
Aux. Cont. A500 Q500

Ui=6kV Uj=690V

제조원 : (주)에스지이엠디
판매원 : **LS산전**
LS IS

MADE IN KOREA
79611621001

LS CONTACTOR 교류전자계測기(접속기)
GMC(D)-9M

HJ02004-6002
220V 9A, 440V 9A

CE 6721 IND.CONF.EQ.

V AC 120 240 480 600
1PH.HP 0.5 1.5 3 5
3PH.HP 3 5 5 5

K60947-4-1 IEC60947
BS5424 VDE0660
AC V 230 400 690

AC3 kW 2.2 4 4
A 9 9 5
AC15 A 6 3 1

Continuous current: 20A
When protected by 20A time
delay fuses. Short circuit 5kA
RMS Sym., 600V Max.
AWG12-18 60/75°C-Cu wire only
Torque: 7lb.in(0.8Nm)
Aux. Cont. A500 Q500

Ui=6kV Uj=690V

제조원 : (주)에스지이엠디
판매원 : **LS산전**
LS IS

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79611621002

LS CONTACTOR 교류전자계測기(접속기)
GMC(D)-12M

HJ02004-6004
220V 12A, 440V 12A

CE 6721 IND.CONF.EQ.

V AC 120 240 480 600
1PH.HP 1 2 3 7.5
3PH.HP 3 7.5 7.5 7.5

K60947-4-1 IEC60947
BS5424 VDE0660
AC V 230 400 690

AC3 kW 3 5.5 4
A 12 12 5
AC15 A 6 3 1

Continuous current: 20A
When protected by 20A time
delay fuses. Short circuit 5kA
RMS Sym., 600V Max.
AWG12-18 60/75°C-Cu wire only
Torque: 7lb.in(0.8Nm)
Aux. Cont. A500 Q500

Ui=6kV Uj=690V

제조원 : (주)에스지이엠디
판매원 : **LS산전**
LS IS

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79611621003

LS CONTACTOR 교류전자계測기(접속기)
GMC(D)-16M

HJ02004-6004 220V 16A, 440V 16A

K60947-4-1 IEC60947 BS5424 VDE0660
AC1=lth=20A Aux.lth=10A
Ui=690V Uimp=6kV

CE 6721 IND.CONF.EQ.

AC V 230 400 690
AC3 kW 4 7.5 4
A 16 16 5
AC15 A 6 3 1

Continuous current: 20A
When protected by 20A time
delay fuses. Short circuit 5kA
RMS Sym., 600V Max.
AWG12-18 60/75°C-Cu wire only
Torque: 7lb.in(0.8Nm)
Aux. Cont. A500 Q500

제조원 : (주)에스지이엠디
판매원 : **LS산전**
LS IS

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79611621004

LS CONTACTOR 교류전자계測기(접속기)
GMC(D)-6M/4

HJ02004-6005
220V 7A, 440V 6A

CE 6721 IND.CONF.EQ.

V AC 120 240 480 600
1PH.HP 0.5 1 3 3
3PH.HP 1.5 3 3 3

K60947-4-1 IEC60947
BS5424 VDE0660
AC V 230 400 690

AC3 kW 1.5 2.2 3
A 7 6 4
AC15 A 6 3 1

Continuous current: 20A
When protected by 20A time
delay fuses. Short circuit 5kA
RMS Sym., 600V Max.
AWG12-18 60/75°C-Cu wire only
Torque: 7lb.in(0.8Nm)
Aux. Cont. A500 Q500

Ui=6kV Uj=690V

제조원 : (주)에스지이엠디
판매원 : **LS산전**
LS IS

MADE IN KOREA
79611621001

LS CONTACTOR 교류전자계測기(접속기)
GMC(D)-9M/4

HJ02004-6005
220V 9A, 440V 9A

CE 6721 IND.CONF.EQ.

V AC 120 240 480 600
1PH.HP 0.5 1.5 3 5
3PH.HP 3 5 5 5

K60947-4-1 IEC60947
BS5424 VDE0660
AC V 230 400 690

AC3 kW 2.2 4 4
A 9 9 5
AC15 A 6 3 1

Continuous current: 20A
When protected by 20A time
delay fuses. Short circuit 5kA
RMS Sym., 600V Max.
AWG12-18 60/75°C-Cu wire only
Torque: 7lb.in(0.8Nm)
Aux. Cont. A500 Q500

Ui=6kV Uj=690V

제조원 : (주)에스지이엠디
판매원 : **LS산전**
LS IS

MADE IN KOREA
79611621002

LS CONTACTOR 교류전자계測기(접속기)
GMC(D)-12M/4

HJ02004-6001
220V 12A, 440V 12A

CE 6721 IND.CONF.EQ.

V AC 120 240 480 600
1PH.HP 1 2 3 7.5
3PH.HP 3 7.5 7.5 7.5

K60947-4-1 IEC60947
BS5424 VDE0660
AC V 230 400 690

AC3 kW 3 5.5 4
A 12 12 5
AC15 A 6 3 1

Continuous current: 20A
When protected by 20A time
delay fuses. Short circuit 5kA
RMS Sym., 600V Max.
AWG12-18 60/75°C-Cu wire only
Torque: 7lb.in(0.8Nm)
Aux. Cont. A500 Q500

Ui=6kV Uj=690V

제조원 : (주)에스지이엠디
판매원 : **LS산전**
LS IS

MADE IN KOREA
79611621003

LS CONTACTOR 교류전자계測기(접속기)
GMC(D)-16M/4

HJ02004-6001 220V 16A, 440V 16A

K60947-4-1 IEC60947 BS5424 VDE0660
AC1=lth=20A Aux.lth=10A
Ui=690V Uimp=6kV

CE 6721 IND.CONF.EQ.

AC V 230 400 690
AC3 kW 4 7.5 4
A 16 16 5
AC15 A 6 3 1

Continuous current: 20A
When protected by 20A time
delay fuses. Short circuit 5kA
RMS Sym., 600V Max.
AWG12-18 60/75°C-Cu wire only
Torque: 7lb.in(0.8Nm)
Aux. Cont. A500 Q500

제조원 : (주)에스지이엠디
판매원 : **LS산전**
LS IS

MADE IN KOREA
79611621004

Test item particulars :		
- kind of equipment	:	Magnetic Contactors
- number of poles	:	3
- kind of current (a.c. or d.c.)	:	AC
- interrupting medium	:	Air
- method of operation	:	Electromagnetic
- method of control	:	Automatic
- method of change-over for particular types of starters		N/A
- method of connecting for particular types of starters:		N/A
-Rated and limiting values, main circuit:		
- rated operational voltage U_e (V)		200-240V, 380-440V, 500-550V, 690V
- rated stator operational voltage U_{es} (V)	:	N/A
- rated rotor operational voltage U_{er} (V)		N/A
- rated insulation voltage U_i (V)		690V
- rated stator insulation voltage U_{is} (V)	:	N/A
- rated rotor insulation voltage U_{ir} (V)	:	N/A
- rated impulse withstand voltage U_{imp} (kV)	:	6kV
- rated starting voltage of an auto-transformer starter(V):		N/A
- conventional free air thermal current I_{th} (A)	:	20A
- conventional enclosed thermal current I_{the} (A)	:	N/A
- conventional stator thermal current I_{ths} (A)	:	N/A
- conventional rotor thermal current I_{thr} (A)	:	N/A
- rated operational current I_e (A) or rated operational powers		See Rating Table above
- rated stator operational current I_{es} (A) or rated stator operational powers		N/A
- rated rotor operational current I_{er} (A)	:	N/A
- rated uninterrupted current I_u (A)	:	N/A
- rated frequency		50/60Hz
- rated duties.....		See Rating Table above
Short-circuit characteristic:		
- rated prospective short-circuit current "r" (kA)	:	Main : 1kA for most models except 3kA for GMC-16M at 200-240 Vac Auxiliary : 1kA
- rated conditional short-circuit current I_q (kA)	:	N/A

Rated and limiting values of the electronically controlled electro-magnet		
- kind of current	:	AC
- power consumption	:	See coil VA consumption table (Page 8)
- rated frequency (or d.c.)	:	50/60Hz
- rated control circuit voltage U_c (nature: a.c. / d.c.)	:	AC 24V-550V, DC 12-250V
- rated control supply voltage U_s (nature: a.c. / d.c.)	:	N/A
- nature of external control circuit devices	:	N/A
Rated and limiting values of air supply control circuit		N/A
- rated pressure	:	
- volumes of air	:	
Rated and limiting values of relays and releases (overload relays)		N/A
- types of relay or release	:	<input type="checkbox"/> a) release with shunt coil (shunt trip) <input type="checkbox"/> b) under voltage and under-current opening relay or release <input type="checkbox"/> c) overload time-delay relay the time-lag of which is: <input type="checkbox"/> 1) substantially independent of previous load (e.g. time-delay magnetic overload relay) <input type="checkbox"/> 2) dependent on previous load (e.g. thermal or electronic overload relay) <input type="checkbox"/> 3) dependent on previous load (e.g. thermal or electronic overload relay) and also sensitive to phase loss <input type="checkbox"/> d) instantaneous over-current relay or release (e.g. jam sensitive, see 3.2.29) <input type="checkbox"/> e) other relays or releases (e.g., control relay associated with devices for the thermal protection of the motor) <input type="checkbox"/> f) Stall relay or release
- characteristic values		
a) release with shunt coil, under-voltage (under-current) opening relay or release	:	N/A
- rated voltage (current)	:	
- rated frequency	:	
- operating voltage (current)	:	
- operating time	:	
- inhibit time	:	
b) Overload relay:		N/A
-designation and current settings	:	
-rated frequency, when necessary (for example in case of a current transformer operated overload relay)	:	
- time-current characteristics (or range of characteristics), when necessary	:	

- trip class according to classification in table 2, or the value of maximum tripping time, in seconds, under the conditions specified in 8.2.1.5.1, table 2, column D, when this time exceeds 40 s. :

- number of poles :

Nature of the relay: thermal, magnetic, electronic without thermal memory :

c) Release with residual current sensing relay:

- rated current

- operating current

- operating time or time-current characteristic according to Table H.1.

Type and characteristics of automatic change-over devices and automatic acceleration control devices

Types

N/A

☐ a) time delay, e.g. time delay contactor relays (see IEC 60947-5-1) applicable to control-devices or specified-time-or nothing relays (see IEC 61810-1)

☐ b) under current devices (undercurrent relays)

☐ c) other devices for automatic control

- ☐ devices dependent on voltage

- ☐ devices on power

- ☐ devices depending on speed

Characteristics:

N/A

a) the characteristics of time-delay devices are:

- the rated time-delay or its range, if adjustable :
- for time-delay devices fitted with a coil, the rated voltage, when it differs from the starter line voltage :

b) the characteristics of the under voltage devices are:

- the rated current (thermal current and /or rated short-circuit withstand current, according to the indications given by the manufacturer) :

- the current setting or its range, if adjustable :

c) the characteristics of the other devices shall be determined by agreement between manufacturer and user

Types and characteristics of auto-transformers for two-step auto-transformer starter

N/A

Account being taken of the starting characteristics (see 5.3.5.5.3), starting auto-transformers shall be characterized by :

- rated voltage of auto-transformer :

- the number of taps available for adjusting torque and current :

- the starting voltage, i.e. the voltage at the tapping terminals, as a percentage of the rated voltage of auto-transformer :

- the current they can carry for a specified duration.....:

-the rated duty(see 5.3.4)	:	
-the method of cooling	:	<input type="checkbox"/> air-cooling <input type="checkbox"/> oil-cooling
Mounting design	:	<input type="checkbox"/> built-in <input type="checkbox"/> or provide separately
Types and characteristics of starting resistors for rheostatic starters	N/A	
Account being taken of the starting characteristics (see 5.3.5.5.1), the starting resistor shall be characterized by :		
- the rated rotor insulation voltage (Uir)		
- their resistor value :		
- the mean thermal current, defined by the value of steady current they can carry for specified duration :		
- the rated duty (see 5.3.4)		
- the method of cooling	:	<input type="checkbox"/> free air <input type="checkbox"/> forced air <input type="checkbox"/> foil immersion
Mounting design	:	<input type="checkbox"/> built-in <input type="checkbox"/> or provide separately
Rated and limiting values, auxiliary circuits:	N/A	
- rated operational voltage Ue (V)		
- rated insulation voltage: Ui (V)		
- rated operational current: Ie (A)		
- kind of current		
- rated frequency: (Hz)		
- number of circuits		
- number and kind of contact elements		
- rated uninterrupted current: Iu (A)		
- utilization category: (AC, DC, current and voltage)		
Short-circuit characteristic :		
- Rated conditional short-circuit current (kA).....	:	N/A
- kind of protective device	:	N/A

Possible test case verdicts:

- test case does not apply to the test object.....: N/A
- test object does meet the requirement.....: P (Pass)
- test object does not meet the requirement.....: F (Fail)

Testing

Date of receipt of test item: 2012-02-07

Date (s) of performance of tests: 2012-03-19 to 2012-05-24

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

"(see Enclosure #)" refers to additional information appended to the report.

"(see appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per Sub-clause 6.2.5 of IEC60947-1:

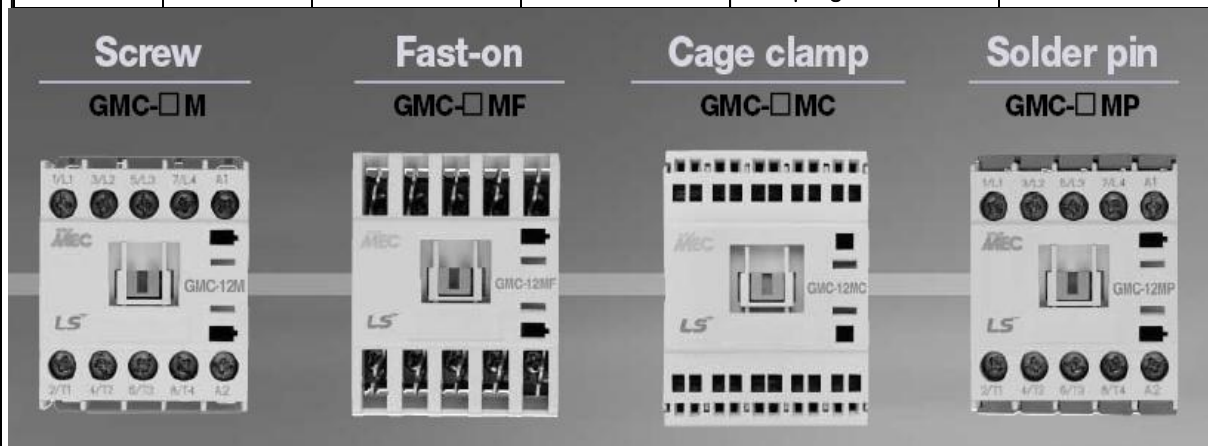
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.....: Not applicable

When differences exist; they shall be identified in the General Product Information section.

Name and address of factory (ies): LSIS Co., Ltd.
CHEONG JU PLANT 1, Song Jung-Dong, Hung Duk-Ku, Cheong Ju-Shi, Chung Cheong Buk-Do, 361-720, Korea

General product information:

GM	C	-9	M	F	/4
Basic series designation	Coil Voltage C = AC D = DC	Amps at 440 V AC3 6 = 6A 9 = 9A 12 = 12A 16 = 16A	Type M = Non Reversing MR = reversing	Optional blank = Screw Terminal F = Fasten Terminal P = Pin Terminal C = Spring Terminal	Optional blank = 3 pole /4 = 4 pole models



IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.2	MARKING		
	Data shall be marked on the equipment (mandatory):		P
	a – manufacturer's name or trade mark	LSIS Co., Ltd, LSIS	P
	b – type designation or serial number	GMC-6M, see the models in cover page	P
	Data preferably marked on the equipment:		P
	c - number of this standard, if the manufacturer claims compliance	IEC60947-4-1	P
	k - IP code, in case of an enclosed equipment	IP20	P
	Data shall be included on the nameplate, or on the equipment, or in the manufacturer's published literature:		P
	d - rated operational voltages	See the Rating Table in page 2	P
	e - utilization category and rated operational currents (or rated powers), at the rated operational voltages of the equipment	Utilization category., rated operational currents and voltages are marked	P
	f - either the value of the rated frequency/ies, or the indication d.c. (or symbol):	50/60Hz	P
	g - rated duty with the indication of the class of intermittent duty, if any	For continuous operation and 8h duty	P
	Associated values:		
	h - rated marking and breaking capacities (these indications may be replaced, where applicable, by the indication of the utilization category, see table 7)	Utilization category is marked	P
	Safety an installation:		P
	i – rated insulation voltage	690V	P
	j – rated impulse withstand voltage (see 5.3.1.3)	6kV	P
	l – pollution degree	3	P

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	m – rated conditional short-circuit current (see 5.3.6) and type of co-ordination of the contactor or starter (see 8.2.5.1) and the type, current rating and characteristics of the associated SCPD; rated conditional short-circuit current (see 5.3.6) of the combination starter, the combination switching device, the protected starter or the protected switching device and type of co-ordination (see 8.2.5.1)	See the Rating Table in page 2	P
	n - Void		N/A
	Control circuits		P
	The following information concerning control circuits shall be placed either on the coil or on the equipment:		P
	o – rated control circuit voltage (U _c), nature of current and rated frequency	AC : 24, 36, 42, 48, 110, 115, 120, 127, 200, 220, 230, 240, 256, 277, 380, 400, 440, 480, 500, 550V 50/60 Hz DC : 12, 20, 24, 36, 42, 48, 60, 72, 110, 120, 125, 220, 240, 250V	P
	p - if necessary, nature of current, rated frequency and rated control supply voltages (U _s)		N/A
	Air supply systems for starter or contactors operated by compressed air		N/A
	Q – rated supply systems of the compressed air and limits of variation of this pressure, if they are different from those specified in 8.2.1.2	-	N/A
	Auxiliary circuits:		
	r – ratings of auxiliary circuits	See the auxiliary contact rating in page 3	P
	Overload relays and releases:		
	s – characteristics according to 5.7, specifying the electronic overload relay does not contain thermal memory		N/A
	Additional information for certain types of contactor and starter:		N/A
	Rheostatic starters:		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	t – circuit diagram		N/A
	u – severity of start, see 5.3.5.5.1		N/A
	v – starting time, see 5.3.5.5.1		N/A
	Auto-transformer starters:		N/A
	w – rated starting voltage(s), i.e. voltage(s) at the tapping terminals		N/A
	Vacuum contactors and starters:		
	x – maximum permissible altitude of the site of installation, if less than 2000 m		N/A
	EMC		N/A
	y – environment A and/or B: see 7.3.1 of part 1	<input type="checkbox"/> A <input checked="" type="checkbox"/> B	P
	z – special requirements, if applicable, for example shielded or twisted conductors		N/A
	Sub clause 5.2 of part 1 applies to contactors, starters and overload relays with the following additions:		P
	Data under items d) to x in 6.1.2 shall be included on the nameplate or on the equipment or in the manufacturer's published literature:		N/A
	Data under items c) and k) in 6.1.2 shall preferably be marked on the equipment		N/A
	In case of electronically controlled electromagnets, information other than given in o) and p) of 6.1.2 may also be necessary: see 5.5 and annex E		N/A
	If the manufacturer declares an electronic overload relay without thermal memory, this shall be marked on the device.		N/A
6.3	Instruction for installation, operation and maintenance		
	The manufacture shall specify, in his documents or catalogues:		P
	- the conditions for installation, operation and maintenance, if any, of the equipment during operation and after a fault		P

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- the specify the measures to be taken with regard to EMC, if any,		N/A
	- equipment only suitable in environment A shall provided with the following notice	NOTICE This product has been designed for environment A. Use of this product in environment B may cause unwanted electromagnetic disturbances in which case the user may be required to taken adequate mitigation measures.	N/A
	- if necessary, the instructions for transport, installation and operation of the equipment shall indicate the measures that are particular importance for the proper and correct installation, commissioning and operation of the equipment.		P
	- manufacturer advice on the measures to be taken in the event of a short-circuit		P
	In case of protected starters (see 3.2.8), the manufacturer shall also provide the necessary mounting and wiring instruction		N/A
8.1	Construction requirements		P
	The equipment with its enclosure, if any, whether integral or not, shall be designed and constructed to withstand the stresses occurring during installation and normal use and, in addition, shall provide a specified degree of resistance to abnormal heat and fire		P
8.1.1	MATERIALS		P
	Sub clause of 7.1.1 of part 1 applies with the following additions		P
	The suitability of materials used is verified by making tests: a) on the equipment; or b) on sections taken from the equipment; or c) on samples of identical material		P
	The suitability shall determined with respect to resistance to abnormal heat and fire		P
	The manufacturer shall indicate which tests, amongst a), b) and c), shall be used	<input type="checkbox"/> a) <input checked="" type="checkbox"/> b) <input type="checkbox"/> c)	P

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Resistance to abnormal heat and to fire		P
	Glow wire test (on equipment), according Cl. 7.1.1.1 of part 1		P
	As described in IEC 60695-2-10 and -2-11		P
	parts retaining current-carrying parts..... Remark : a protective conductor is not considered as a current-carrying part	<input checked="" type="checkbox"/> $850 \pm 15^{\circ}\text{C}$ or <input type="checkbox"/> $960 \pm 15^{\circ}\text{C}$ _____ s	P
	all other parts	<input checked="" type="checkbox"/> $650 \pm 10^{\circ}\text{C}$ _____ s	P
	No visible flame, no sustained glowing or flames and glowing extinguish within 30 s		P
	Flammability, hot wire ignition and arc ignition tests (on materials)), according Cl. 7.1.1.1 of part 1		N/A
	When tests on materials are used, they shall be made according to the tests for flammability classification, hot wire ignition and ,where applicable, arc ignition, as specified in 8.2.1.1.2 The materials used shall comply with the values given in table M.1 of part 1 according to the manufacturer's chosen flammability category (see IEC 60695-11-10)		N/A
	Flammability, hot wire ignition an arc ignition tests (on materials) according 8.2.1.1.2 of part 1		N/A
	Suitable specimens of material shall be subjected to the following tests: a) flammability tests, in accordance with IEC 60695-11-10 b) Hot wire ignition (HWI) test, as described in Annex M c) Arc ignition (AI) test, as described in Annex M		
	a) Flammability tests, in accordance with IEC 60695-11-10		N/A
	Test method	<input type="checkbox"/> A) – Horizontal burning test <input type="checkbox"/> B) – Vertical burning test	N/A
	b) Hot wire ignition (HWI) test, as described in Annex M		N/A
	c) Arc ignition (AI) test, as described in Annex M		N/A
8.1.2	Current-carrying parts and their connection (see 7.1.2)		P
	No contact pressure through insulating materials		P
8.1.3	Clearances and creepage distances		P
	Clause 7.1.3 of part 1 applies		P
	Clearances		P
	Rated impulse withstand voltage (see test sequence I)	U _{imp} = 6 kV	P
	Creepage distances		P

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Pollution degree	3	P
	Comparative tracking index (V)	$400V \leq CTI < 600V$	P
	Material group	II	P
	Rated insulation voltage U_i (V)	690V	P
	Minimum creepage distances (mm)	9.0 mm	P
	Measured creepage distances (mm)	Main to Main : 9.5 mm Coil A1 to Coil A2 : 28.0 mm Main to Coil : 9.5 mm	P
	In case U_{imp} is not indicated		N/A
8.1.4	Actuator		
	Sub-clause 7.1.4 of part 1 applies when the actuator is manually operated with the following addition:		N/A
	The operating handle of the manually operated switching device of combination starter shall be provided with means for padlocking it in the OFF position.		N/A
8.1.4.3	Mounting		
	Actuators mounted on removable panels or opening doors are so designed that when the panels are replaced or doors closed the actuator will engage correctly with the associated mechanism		N/A
8.1.5	Indication of contact position		N/A
8.1.5.1	Indication means, see 7.1.5.1 part 1 applies to manually operated starters	I On 0 off	N/A
8.1.5.2	Indication by the actuator, see 7.1.5.1 part 1		N/A
8.1.6	Additional safety requirements for equipment suitable for isolation , see clause 7.1.6.1 part 1 applies and the additions marked with *)		N/A
7.1.6.1 part 1	Additional constructional requirements:		N/A
	- marking according to 5.2.		N/A
	- indication of the position of the contacts		N/A
	- construction of the actuating mechanism		N/A
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm)		N/A
	- measured clearances (mm)		N/A
	- test U_{imp} across gap (kV)		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	*) Devices provided with positions like trip position or stand-by positions which are not the indicated open position shall be clearly marked.		N/A
	*) An indicator having only one position of rest shall not be considered as appropriate to indicate the position of the main contact.		N/A
7.1.6.2 part 1	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers:		N/A
	Auxiliary switch is rated according to IEC 60947-5-1 (unless the equipment is rated AC-23)		N/A
	Time interval between opening of the contacts of the auxiliary contact and the contacts of the main poles: ≥ 20 ms		N/A
	Measured time interval (ms)		N/A
	During the closing operation the contacts of the auxiliary switch closes after or simultaneously with the contacts of the main poles		N/A
7.1.6.3 part 1	Supplementary requirements for equipment provided with means for padlocking the open position:		N/A
	The locking means is so designed that it cannot be removed with the appropriate padlock(s) installed		N/A
	Test force F applied to the actuator in an attempt to operate to the closed position (N)		N/A
	Rated impulse withstand voltage (kV)		N/A
	Test Uimp on open main contacts at the test force		N/A
8.1.7	Terminals		
	clause 7.1.7.1 part 1 applies		P
7.1.7.1 part 1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength	(see 8.2.4 part 1 below)	P
	Terminal connections shall be such that necessary contact pressure is maintained	(see 8.2.4 part 1 below)	P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	(see 8.2.4 part 1 below)	P
	Terminal shall not allow the conductor to be displaced or to be displaced themselves in a manner detrimental to the operator of equipment and the insulation voltage shall not be reduced below the rated value	(see 8.2.4 part 1 below)	P
	If required by application, terminals and conductors may be connected by means of cable lugs for copper conductors only		P

IEC 60947-4-1			
Clause	Requirement + Test		Verdict
8.2.4 part 1	Mechanical properties of terminals		
	see clause 8.2.4 part 1 applies		P
8.2.4.2	Mechanical strength of terminals		P
	maximum cross-sectional area of conductor (mm ²) :	12 AWG	
	diameter of thread (mm)	3.4 mm	
	torque (Nm)	0.8 Nm	
	5 times on 2 separate clamping units		P
8.2.4.3	Testing for damage to and accidental loosening of conductor (flexion test)		P
	conductor of the smallest cross-sectional area (mm ²)	18 AWG	
	number of conductor of the smallest cross section	1	
	diameter of bushing hole (mm)	6.5 mm	
	height between the equipment and the platen (mm)	260 mm	
	mass at the conductor(s) (kg)	0.4 kg	
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
8.2.4.4	Pull-out test		P
	force (N)	30 N	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Flexion test		P
	conductor of the largest cross-sectional area (mm ²)	12 AWG	
	number of conductor of the largest cross-sectional	1	
	diameter of bushing hole (mm)	9.5 mm	
	height between the equipment and the platen (mm)	280 mm	
	mass at the conductor(s) (kg)	0.9 kg	

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		P
	force (N)	60 N	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Flexion test		P
	conductor of the largest and smallest cross-sectional area (mm ²)		
	number of conductor of the smallest cross sectional, number of conductor of the largest cross sectional		
	diameter of bushing hole (mm)		
	height between the equipment and the platen (mm)		
	mass at the conductor(s) (kg)		
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		P
	Pull-out test		N/A
	force (N)		
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
7.1.7.2	Connecting capacity		P
	type of conductors	Stranded	
	minimum cross-sectional area of conductor (mm ²)	18 AWG	
	maximum cross-sectional area of conductor (mm ²)	12 AWG	
	number of conductors simultaneously connectable to the terminal	1	
7.1.7.3	Connection		P

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	terminals for connection to external conductors shall be readily accessible during installation		P
	clamping screws and nuts shall not serve to fix any other component		P
8.1.7.4	Terminal identification and marking		P
8.1.7.4	Subclause 7.1.7.4 of part 1 applies with the additional requirements of annex A		P
	terminal intended exclusively for the neutral conductor		N/A
	protective earth terminal		N/A
	other terminals		P
8.1.8	Additional requirements for equipment provided with a neutral pole		N/A
	Sub clause 7.1.8 of part 1 applies		N/A
	marking of neutral pole		N/A
	The switched neutral pole shall not break before and shall not make after the other poles		N/A
	Conventional thermal current of neutral pole		N/A
	If a pole having an appropriate short-circuit breaking and making capacity is used as a neutral pole, then all poles, including the neutral pole, may operate substantially together.		N/A
	Equipment having a value $I_{th} < 63$ A, this value shall be identical for all poles		N/A
	For $I_{th} > 63$ A, the neutral pole may have a value of I_{th} different from that of the other poles, but not less than the half that value or 63 A, whichever is the higher.		N/A
8.1.9	Provisions for earthing		N/A
	Sub clause 7.1.9 of part 1 applies		N/A
7.1.9.1 part 1	The exposed conductive parts shall be electrically interconnected and connected to a protective earth terminal		N/A
7.1.9.2 part 1	The protective earth terminal shall be readily accessible		N/A
	The protective earth terminal shall be suitably protected against corrosion		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The electrical continuity between the exposed conductive parts of the protective earth terminal and the metal sheathing of connecting conductors		N/A
	The protective earth terminal shall have no other functions		N/A
7.1.9.3 part1	Protective earth terminal marking and identification		N/A
8.1.10	Enclosure for equipment		N/A
7.1.10.1 part1	Design		N/A
	Sub clause 7.1.10 of part 1 applies with the follow additions		N/A
	Starting resistors mounted within an enclosure shall be so located or guarded that issuing heat is not detrimental to other apparatus and materials within the enclosure.		N/A
	For the specified case of combination starters, the cover or door shall be interlocked so that it cannot be opened without manually operated device being in open position.		N/A
	However, provision may be made to open the door or cover with the manually operated switching device in the ON position by use of a tool.		N/A
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible		N/A
	Sufficient space shall be provided inside the enclosure		N/A
	The fixed parts of a metal enclosure shall be electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor		N/A
	Under no circumstances shall a removable metal part of the enclosure be insulated from the part carrying the earth terminal when the removable part is in place		N/A
	The removable parts of the enclosure shall be firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations		N/A
	When an enclosure is so designed as to allow the covers to be opened without the use of tools, means shall be provided to prevent loss of the fastening devices		N/A
7.1.10.2 part1	Insulation		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If, in order to prevent accidental contact between a metallic enclosure and live parts, the enclosure is partly or completely lined with insulating material, then this lining shall be securely fixed to the enclosure		N/A
8.1.11	Degree of protection of enclosed contactors and starters		P
	Sub clause 7.1.11 of part 1 applies		P
	Degree of protection: IP20		P
	Test for first characteristic		P
	Test for first numeral: 1: 2: Sphere of 12.5 mm (diameter) not entered 3: 4: 5: 6:		
	Test for second characteristic		N/A
	Test for second numeral: 1: 2: 3: 4: 5: 6: 7: 8:		

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Clause	Requirement + Test	Result - Remark	Verdict																						
9.3.1.a	TEST SEQUENCE I																								
	- verification of temperature rise (Clause 9.3.3.3.)																								
	- verification of operation and operating limits (Clause 9.3.3.1 and 9.3.3.2)																								
	- verification of dielectric properties (Clause 9.3.3.4)																								
9.3.3.3	Temperature rise																								
	Sub clause 8.3.3.3. of part 1 applies																								
	ambient temperature 10-40 °C	ambient temperature <table><tr><td>Type</td><td>AC</td><td>°C</td></tr><tr><td>GMC-6M</td><td>550V</td><td>20.8</td></tr><tr><td>Type</td><td>DC</td><td>°C</td></tr><tr><td>GMD-6M</td><td>240V</td><td>21.4</td></tr><tr><td>GMD-6MC</td><td>240V</td><td>21.5</td></tr><tr><td>GMD-6MF</td><td>240V</td><td>21.5</td></tr><tr><td>GMD-6MP</td><td>240V</td><td>21.0</td></tr></table>		Type	AC	°C	GMC-6M	550V	20.8	Type	DC	°C	GMD-6M	240V	21.4	GMD-6MC	240V	21.5	GMD-6MF	240V	21.5	GMD-6MP	240V	21.0	
Type	AC	°C																							
GMC-6M	550V	20.8																							
Type	DC	°C																							
GMD-6M	240V	21.4																							
GMD-6MC	240V	21.5																							
GMD-6MF	240V	21.5																							
GMD-6MP	240V	21.0																							
	Magnetic Contactor			P																					
	test enclosure W x H x D (mm x mm x mm)	Without enclosure																							
	material of enclosure																								
9.3.3.3.4	Main circuits, test conditions:			P																					
	Sub clause 8.3.3.3.4 of part 1 applies with following addition																								
	loaded as stated in 8.2.2.4																								
	- setting of the maximum current setting																								
	- setting overload relay																								
	- conventional thermal current Ith (A)	20A																							
	- conventional enclosed thermal current Ithe (A) .:																								
	- cable/busbar cross-section (mm²) / (mm)	12 AWG																							
	- temperature rise of main circuit terminals (K)	1. GMC-6M : See table 1 2. GMD-6M : See table 2 3. GMD-6MC : See table 3 4. GMD-6MF : See table 4 5. GMD-6MP : See table 5		P																					
9.3.3.3.5	Control circuit, test conditions:			N/A																					
	Sub clause 8.3.3.3.5. of part 1 applies with following addition																								

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Clause	Requirement + Test	Result - Remark	Verdict														
	The temperature rise shall be measures during the test of 9.3.3.3.4																
	- conventional thermal current I _{th} (A) at their rated voltage																
	- conventional enclosed thermal current I _{the} (A) . :																
	- cable/busbar cross-section (mm²) / (mm)																
	- temperature rise of control circuit (K)		N/A														
9.3.3.3.6	Coils and electromagnets circuit, test conditions:		P														
	a) Uninterrupted and eight-hour duty windings (8.2.2.6.1)																
	The temperature rise shall be measures during the test of 9.3.3.3.4																
	- rated control supply voltage U _s (V)	U _s (V) <table><tr><th>Type</th><th>AC</th></tr><tr><td>GMC-6M</td><td>550V / 60Hz</td></tr><tr><th>Type</th><th>DC</th></tr><tr><td>GMD-6M</td><td>240V</td></tr><tr><td>GMD-6MC</td><td>240V</td></tr><tr><td>GMD-6MF</td><td>240V</td></tr><tr><td>GMD-6MP</td><td>240V</td></tr></table>	Type	AC	GMC-6M	550V / 60Hz	Type	DC	GMD-6M	240V	GMD-6MC	240V	GMD-6MF	240V	GMD-6MP	240V	
Type	AC																
GMC-6M	550V / 60Hz																
Type	DC																
GMD-6M	240V																
GMD-6MC	240V																
GMD-6MF	240V																
GMD-6MP	240V																
	- class of insulating material	E															
	- uninterrupted or eight-hour duty windings																
	- temperature rise of control circuit terminals (K) . :	1. GMC-6M : See table 1 2. GMD-6M : See table 2 3. GMD-6MC : See table 3 4. GMD-6MF : See table 4 5. GMD-6MP : See table 5	P														
	b) Intermittent duty windings (8.2.2.6.2)																
	- no current flowing though the main circuit																
	- rated control supply voltage U _s (V)																
	- class of insulating material																
	- intermittent duty class																
	- close open operating cycle																
	- on-load factor																
	- temperature rise of control circuit terminals (K) . :	< ____ K see page ____	N/A														
	c) temporary or periodic duty (8.2.2.6.3)																
	- no current flowing though the main circuit																
	- rated control supply voltage U _s (V)																

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Clause	Requirement + Test	Result - Remark	Verdict
	- class of insulating material		
	- close open operating cycle		
	- on-load time		
	- temperature rise of control circuit terminals (K) .:	< ____ K see page ____	N/A
9.3.3.3.7	Auxiliary circuit, test conditions:		N/A
	Normally loaded with their maximum rated operational current at any convenient voltage	10 A	
	The temperature rise shall be measures during the test of 9.3.3.3.4		
	- conventional thermal current I _{th} (A)		
	- conventional enclosed thermal current I _{the} (A) .:		
	- cable/busbar cross-section (mm ²) / (mm)		
	- cable cross-section (mm ²)	18 AWG	
	- temperature rise of auxiliary circuit terminals (K)	See Table 1~5	P
9.3.3.3.8	Starting resistors for rheostatic rotor starters test conditions:		N/A
	Normally loaded with their current value I _m		
	Number of starts per hour		
	Rated duty		
	Starting characteristic	See page ____	
	- cable/busbar cross-section (mm ²) / (mm)		
	- cable cross-section (mm ²)		
	- temperature rise of starting resistor terminals (K)	See table 3 of part 1	
	- temperature rise of starting resistor enclosure (K)	See table 3 of part 1	
	- temperature rise of issuing air (K)	See table 3 of part 1	
		
		
		
		
9.3.3.3.9	Auto-transformers for two-step auto-transformers starters		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Normally loaded with max. Starting current multiplied with $0,8 \times \frac{\text{starting voltage}}{U_e}$		
	Number of starts per hour.....:		
	Rated duty.....:		
	Starting characteristic	See page	
	- cable/busbar cross-section (mm ²) / (mm)		
	Temperature rise of:		
	- windings (K), See table 5 (+15 %).....:		
	- operating means (K) , See table 3 of part 1		
	- parts intended to be touched but not hand held (K) , See table 3 of part 1		
	- parts which need not be touched during normal operation (K) , See table 3 of part 1		N/A
9.3.3	Performance under no load, normal load and overload conditions		
9.3.3.1	Operation		
	For starter only:		
	reference ambient temperature(i.e. +20 °C) :		
	Rated full load current (A) :		
	No tripping after 3 operations when stator has reached thermal equilibrium at minimum and maximum settings		N/A
	For overload relay with combined stop and reset actuating mechanism only		
	With closed contactor, the resetting mechanism shall be operated and this shall cause the contactor drop out		N/A
	For overload relay with either a reset or separate stop and reset mechanism only		
	With closed contactor and resetting mechanism in the reset position, the tripping mechanism shall be operated and the contactor shall have been caused to drop out		N/A
9.3.3.2	Operating limits		P
9.3.3.2.1	Power-operated equipment:		
8.2.1.2.1	Electromagnetic contactors and starters		P

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Clause	Requirement + Test	Result - Remark	Verdict																					
	rated control supply voltage U_s (V):	<div>Us (V)</div> <table><tr><th>Type</th><th>AC</th></tr><tr><td>GMC-6M</td><td>550V / 60Hz</td></tr><tr><th>Type</th><th>DC</th></tr><tr><td>GMD-6M</td><td>240V</td></tr><tr><td>GMD-6MC</td><td>240V</td></tr><tr><td>GMD-6MF</td><td>240V</td></tr><tr><td>GMD-6MP</td><td>240V</td></tr></table>	Type	AC	GMC-6M	550V / 60Hz	Type	DC	GMD-6M	240V	GMD-6MC	240V	GMD-6MF	240V	GMD-6MP	240V								
Type	AC																							
GMC-6M	550V / 60Hz																							
Type	DC																							
GMD-6M	240V																							
GMD-6MC	240V																							
GMD-6MF	240V																							
GMD-6MP	240V																							
	frequency (Hz):	GMC-6M : AC 60 Hz GMD-6M, GMC-6MC, GMD-6MF and GMD-6MP : DC																						
	declared ambient temperature(>40 °C) for 100% U_s:	40 °C																						
	limits of close satisfactorily at any value between 85% and 110% of rated control supply voltage U_s:	<div>Close satisfactory at +40°C</div> <table><tr><th>Type</th><th>85%</th><th>110%</th></tr><tr><td>GMC-6M</td><td>AC467.5</td><td>AC605.0</td></tr><tr><th>Type</th><th>85%</th><th>110%</th></tr><tr><td>GMD-6M</td><td>DC204.0</td><td>DC264.0</td></tr><tr><td>GMD-6MC</td><td>DC204.0</td><td>DC264.0</td></tr><tr><td>GMD-6MF</td><td>DC204.0</td><td>DC264.0</td></tr><tr><td>GMD-6MP</td><td>DC204.0</td><td>DC264.0</td></tr></table>	Type	85%	110%	GMC-6M	AC467.5	AC605.0	Type	85%	110%	GMD-6M	DC204.0	DC264.0	GMD-6MC	DC204.0	DC264.0	GMD-6MF	DC204.0	DC264.0	GMD-6MP	DC204.0	DC264.0	P
Type	85%	110%																						
GMC-6M	AC467.5	AC605.0																						
Type	85%	110%																						
GMD-6M	DC204.0	DC264.0																						
GMD-6MC	DC204.0	DC264.0																						
GMD-6MF	DC204.0	DC264.0																						
GMD-6MP	DC204.0	DC264.0																						
	limits of drop out and open fully are: 75% to 20% for a.c. and 75% to 10% for d.c.:	<div>Drop out at +40°C</div> <table><tr><th>Type</th><th>AC(75% to 20%)</th></tr><tr><td>GMC-6M</td><td>258.6 V / 60Hz</td></tr><tr><th>Type</th><th>DC(75% to 10%)</th></tr><tr><td>GMD-6M</td><td>43.4 V</td></tr><tr><td>GMD-6MC</td><td>35.2 V</td></tr><tr><td>GMD-6MF</td><td>34.9 V</td></tr><tr><td>GMD-6MP</td><td>40.3 V</td></tr></table>	Type	AC(75% to 20%)	GMC-6M	258.6 V / 60Hz	Type	DC(75% to 10%)	GMD-6M	43.4 V	GMD-6MC	35.2 V	GMD-6MF	34.9 V	GMD-6MP	40.3 V	P							
Type	AC(75% to 20%)																							
GMC-6M	258.6 V / 60Hz																							
Type	DC(75% to 10%)																							
GMD-6M	43.4 V																							
GMD-6MC	35.2 V																							
GMD-6MF	34.9 V																							
GMD-6MP	40.3 V																							
	ambient temperature(-5 °C) for 100% U_s	-5 °C																						
	Drop out test method		P																					
	Limits of drop out and open fully are: 75% to 20% for a.c. and 75% to 10% for d.c.:	<div>Drop out at -5°C</div> <table><tr><th>Type</th><th>AC(75% to 20%)</th></tr><tr><td>GMC-6M</td><td>248.7 V / 60Hz</td></tr><tr><th>Type</th><th>DC(75% to 10%)</th></tr><tr><td>GMD-6M</td><td>34.8 V</td></tr><tr><td>GMD-6MC</td><td>29.2 V</td></tr><tr><td>GMD-6MF</td><td>30.0 V</td></tr><tr><td>GMD-6MP</td><td>34.4 V</td></tr></table>	Type	AC(75% to 20%)	GMC-6M	248.7 V / 60Hz	Type	DC(75% to 10%)	GMD-6M	34.8 V	GMD-6MC	29.2 V	GMD-6MF	30.0 V	GMD-6MP	34.4 V	P							
Type	AC(75% to 20%)																							
GMC-6M	248.7 V / 60Hz																							
Type	DC(75% to 10%)																							
GMD-6M	34.8 V																							
GMD-6MC	29.2 V																							
GMD-6MF	30.0 V																							
GMD-6MP	34.4 V																							
8.2.1.2.2	Contactors and starters with electronically controlled electromagnet																							

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated control supply voltage U_s (V)		
	Frequency (Hz)		
	Declared ambient temperature(>40 °C) for 100% U_s		
	Limits of close satisfactorily at any value between 85% and 110% of rated control supply voltage U_s		N/A
	Limits of drop out and open fully are: 75% to 20% for a.c. and 75% to 10% for d.c.		N/A
	Ambient temperature(-5 °C) for 100% U_s		
	Drop out test method		N/A
	Limits of drop out and open fully are: 75% to 20% for a.c. and 75% to 10% for d.c.		N/A
8.2.1.2.3	Electro-pneumatic contactors and starters		
	Rated air supply pressure (Bar)		
	Declared ambient temperature(>40 °C) for 100% of the rated air supply pressure (Bar)		
	Limits of close satisfactorily at any value between 85% and 110% of rated air supply pressure (Bar) :		N/A
	Limits of drop out and open fully are: 75% to 10% of rated air supply pressure(Bar)		N/A
	Ambient temperature(-5 °C) for 100% of the rated air supply pressure(Bar)		N/A
	Limits of close satisfactorily at any value between 85% and 110% of rated air supply pressure(Bar:		N/A
	Limits of drop out and open fully are: 75% to 10% for the rated air supply pressure(Bar) :		N/A
8.2.1.2.4	Capacitive drop out test		
	A capacitor shall be inserted in series in the supply circuit U_s , the total length of the connecting conductors being ≤ 3 m.		
	The capacitor is short-circuit by a switch of negligible impedance.		

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Clause	Requirement + Test	Result - Remark	Verdict
	The supply voltage shall then be adjusted to 110 % U_s		
	The value of the capacitor shall be calculated: $C \text{ (nF)} = 30 + 200000 / (f \times U_s)$		
	Verification of the drop out of the contactor when the switch is operated to the open position		N/A
9.3.3.2.2	Relays and releases		
8.2.1.3	a) Operation of under-voltage relays and releases		N/A
	type of under-voltage relay		
	Rated control supply voltage(U)		
	Frequency (Hz)		
	Limits of drop out and fully open at slowly falling voltage are 70 % and 35 % of the rated voltage		N/A
	Prevent to close if supply voltage < 35 % of the rated voltage		N/A
	Limits of close satisfactorily at any value between 85 % and 110 %		N/A
8.2.1.4	b) Shunt-coil operated releases (shunt trip)		
	Tripping of shunt release measured during the tripping operation between 70 % and 110 % of the rated control supply voltage and if a.c. at rated frequency		N/A
8.2.1.5	Limits of operation of current sensing relays and releases		
8.2.1.5.1	Limits of operation of time-delay overload relays when all poles are energized		N/A
8.2.1.5.1.1	Common requirements		
	type of time-delay overload relay		
	trip class		
	current setting		
	ambient temperature °C)		
	test enclosure W x H x D (mm x mm x mm)		
	cable/busbar cross-section (mm ²) / (mm)		
	ambient temperature: - 5°C		N/A
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current	No tripping;A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current	Tripping;A	N/A
	c) for class 2, 3, 5 and 10 A overload relays energized at C times the current setting, tripping shall occur in less than 2 min starting from thermal equilibrium, at the current setting, in accordance with 9.3.3 of IEC 60034-1; for class 10 A overload relays, for ambient air temperature –5 °C or below, the manufacturer may declare a longer tripping time but not longer than 2 times the values required for 20 °C	Class; ____ Tripping current ____ A Trip-time: ____ s	N/A
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time	Class; ____ Tripping current ____ A Trip-time: ____ s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s)	Class; ____ Tripping current ____ A Trip-time: ____ s	N/A
	ambient temperature: + 20 °C		
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current	Test current: ____ A	N/A
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current	Test current Trip time: ____ s	N/A
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current	Test current Trip time: ____ s	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	d) for class 10, 20 , 30 and 40 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the limits given in Table 2 for the appropriate trip class and tolerance band, starting from the cold state; test current; tripping time Tp (s)	Class; ____ Tripping current ____ A Trip-time: ____ s	N/A
	ambient temperature: + 40 °C		
	a) at A times of current setting, tripping shall not occur in less than 2 h starting from the cold state; test current	Test current: ____ A	N/A
	b) when the current is subsequently raised to B times the current setting, tripping shall occur in less than 2 h; test current	Test current Trip time: ____s	N/A
	c) for class 2, 3, 5 and 10A overload relays energized at C times the current, tripping shall occur in less than 2 min, starting from thermal equilibrium at the current setting; test current	Test current Trip time: ____s	N/A
	d) for class 10, 20 or 30 overload relays energized at C times the current, tripping shall occur in less than 4, 8 or 12 min, starting from thermal equilibrium at the current setting; class; test current; tripping time	Test current Trip time: ____s	N/A
	e) at D times the current setting, tripping shall occur within the tripping time (s) < Tp <, starting from the cold state; test current; tripping time Tp (s)	Class; ____ Tripping current ____ A Trip-time: ____ s	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

8.2.1.5.1.2	Thermal memory test verification		N/A
	Unless the manufacturer has specified that the device does not contain thermal memory, electronic overload relays shall fulfil the following requirements (see figure 8)		N/A
	Apply a current equal to I_e until the device has reached the thermal equilibrium	$I_e = \text{_____ A}$	N/A
	Interrupt a current for a duration of $2 \times T_p$ (see Table 2) with a relative tolerance of 10% (where T_p is the time measured at the D current according to Table 3).	$T_p = \text{_____ A}$ $D = \text{_____ A}$ Measured time $T_p = \text{_____ s}$	N/A
	Apply a current equal to $7,2 \times I_e$	$I_{\text{test}} = \text{_____ A}$	N/A
	The relay shall trip within 50% of the time TP	Trip time = _____ s	N/A

8.2.1.5.2	Limits of operation of three-pole time-delay overload relays energized on two poles:							
	ambient temperature (°C)						N/A	
	In case of overload relays having an adjustable current setting, the characteristics shall apply both when the relay is carrying the current associated with the maximum setting and when the relay is carrying the current associated with the minimum setting							
	a) the relay energized on three poles, at A times the current setting, tripping shall not occur in less than 2 h, starting from the cold state; test current	RT	S	RS	T	ST	R	N/A
	b) when the value of the current flowing in two poles is increased to B times the current setting and the third pole deenergized, tripping shall occur in less than 2 h; current value; test current	RT	S	RS	T	ST	R	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.2.1.5.3	Limits of operation of instantaneous magnetic overload relays		
	For all values of the current setting, instantaneous magnetic overload relays shall trip with an accuracy of $\pm 10\%$ of the value of the published current value corresponding to the current setting		N/A
	Magnetic settings..... :		
	Accuracy $\pm 10\%$ of the value.....:		N/A
8.2.1.5.4	Limits of operation of under-current relays and releases for automatic change over		N/A
8.2.1.5.4.1	e) Limits of operation under-current relays		N/A
	Under-current relays or release, when associated with a switching device, shall operate to open the switching device within 90% to 110 % of the set time when the current during run is below 0,9 times the under-current setting in all poles	Under current setting: _____A Test current: _____A Set time: _____s Measured: _____s	N/A
8.2.1.5.4.2	f) Limits of operation of automatic change over by under-current relays		N/A
	- for star-delta starters from star to delta, and - for auto-transformer starters from the starting to the ON position		N/A
	The lowest drop-out of an under-current relay shall be not greater than 1,5, times the actual current setting of the overload relay which is active in the starting or star connection.	Lowest drop-out:A / Actual current setting:A = $\leq 1,5$ times	N/A
	The under-current relay shall be able to carry any value of current , from its lowest current setting to stalled current in the starting position or the star connection, for the tripping times determined by the overload relays at its highest current setting		N/A
8.2.1.5.5.	g) Stall relays		N/A
	The limits of operation shall be verified accordance with cl. 8.2.1.5.5		N/A
	For currents sensing stall relays , the verification shall be made for the minimum and for the maximum set current values and for the minimum and maximum stall inhibit time(four settings)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For stall relays operating in conjunction with a rotation sensing mean, the verification shall be made for the minimum and maximum stall inhibit time. The sensor can be simulated by an appropriate signal on the sensor input of the stall relay		N/A
	a) current sensing relays		N/A
	minimum current setting / minimum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____ s	N/A
	minimum current setting / maximum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____ s	N/A
	maximum current setting / minimum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____ s	N/A
	maximum current setting / maximum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____ s	N/A
	b) rotation sensing relays: an input signal indicating no rotation exits		N/A
	minimum set stall inhibit time	_____ s Trip time = _____ s	N/A
	maximum set stall inhibit time	_____ s Trip time = _____ s	N/A
8.2.1.5.6.	h) Jam relays		N/A
	The limits of operation shall be verified accordance with cl. 8.2.1.5.6		N/A
	The verification shall be made for the minimum and for the maximum set current values and for the minimum and maximum stall inhibit time (four settings)		N/A
	For each of the four settings, the test shall be made under the following conditions:		N/A
	- apply a test current of 95% of the set current value. The jam relay shall not trip		N/A
	- increase the test current to 120 % of the set current value. The jam relay shall trip according to the requirements given in 8.2.1.5.6		N/A
	minimum current setting / minimum set stall inhibit time Test current 95 % of set value	_____ s _____ A	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
		no trip	
	minimum current setting / minimum set stall inhibit time Test current increase to 1,2 times	_____ A _____ s Trip time = _____ s	N/A
	minimum current setting / maximum set stall inhibit time Test current 95 % of set value	_____ s _____ A no trip	N/A
	minimum current setting / maximum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____ s	N/A
	maximum current setting / minimum set stall inhibit time Test current 95 % of set value	_____ s _____ A no trip	N/A
	maximum current setting / minimum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____ s	N/A
	maximum current setting / maximum set stall inhibit time Test current 95 % of set value	_____ s _____ A no trip	N/A
	maximum current setting / maximum set stall inhibit time Test current 1,2 times	_____ A _____ s Trip time = _____ s	N/A
9.3.3.4	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
	- verification by measurement of clearances instead of testing		P
	Any actuator of insulating material and any integral non-metallic enclosure of equipment intended to be used without an additional enclosure shall be covered by a metal foil and connected to the frame or the mounting plate.		
	Tests are also carried out according Annex R of IEC 60947-1, Ed. 5, application of the metal foil for dielectric testing on accessible parts during operation or adjustment		P

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Terminal holes covered	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no	P
	- rated impulse withstand voltage (V)	6 kV	
	- test U _{imp} main circuits (kV)	7.3 kV	P
	- test U _{imp} auxiliary circuits (kV)	7.3 kV	P
	Test of dielectric properties, dielectric withstand voltage (U _{imp} not indicated):		N/A
	- rated insulation voltage (V)		
	- main circuits, test voltage for 5 s (V)		N/A
	- control and auxiliary circuits, test voltage for 5-s (V)		N/A
	- circuits of equipment include devices such as motors, instruments ect, test voltage for 5 s (V) ..		N/A
	Equipment suitable for isolation		
	The leakage current shall be measured through each pole with the contacts in open position (< 0,5 mA)	1,1 times U _e = ____V	N/A

9.3.1.b	TEST SEQUENCE II			
	Verification of rated making and breaking capacities, change-over ability and reversibility, where applicable (Clause 9.3.3.5.)			P
	- verification of conventional operational performance (Clause 9.3.3.6)			P
9.3.3.5	Making and breaking capacity			
	Conditions, make operations only.....			
	Type of product	GMC-6M	GMC-6M	
	utilization category	AC-4	AC-3	
	Control voltage 25 times at 110% and 25 times at 85% for AC-3 and AC-4			
	rated operational voltage U _e (V) :	440 V	690 V	
	rated operational current I _e (A) or power (kW)	6 A	4 A	
	- test voltage (V) U/U _e = 1,05	L1: 472.5 L2: 479.1 L3: 482.2	L1: 746.8 L2: 748.9 L3: 759.1	
	- test current (A) I/I _e = ____	L1: 75.5 L2: 74.7 L3: 74.6	L1: 43.5 L2: 42.4 L3: 42.8	

IEC 60947-4-1				
Clause	Requirement + Test	Result - Remark		Verdict
	- power factor/time constant	L1: 0.45 L2: 0.46 L3: 0.47	L1: 0.45 L2: 0.47 L3: 0.49	
	- on-time (ms)	50 ms	50 ms	
	- off-time (s)	10 s	10 s	
	- number of make operations	50	50	
	Behaviour and condition during and after the test:			
	- no permanent arcing			P
	- no flash-over between poles			P
	- no blowing of the fusible element in the earth circuit			P
	- no welding of the contacts			P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control			P
	Conditions, make/break operations only			P
	Type of product	GMC-6M	GMC-6M	P
	utilization category	AC-4	AC-3	
	rated operational voltage U_e (V)	440 V	690 V	
	rated operational current I_e (A) or power (kW)	6 A	4 A	
	For starters incorporated two contactors, 2 contactor shall be used with the following sequence: Close A – open A – close B – open B- off period			P
	- test voltage (V) $U/U_e = 1,05$	L1: 472.8 L2: 475.4 L3: 481.7	L1: 747.2 L2: 751.9 L3: 755.3	—
	- test current (A) $I/I_e = \text{_____}$	L1: 64.4 L2: 63.4 L3: 63.6	L1: 38.1 L2: 37.1 L3: 37.2	
	- power factor/time constant	L1: 0.44 L2: 0.46 L3: 0.47	L1: 0.46 L2: 0.46 L3: 0.49	
	- on-time (ms)	50 ms	50 ms	
	- off-time (s)	10 s	10 s	
	- number of operations	<input type="checkbox"/> 50 make <input checked="" type="checkbox"/> 50 make/ break		
	Number of operation energized simultaneously	10		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		
	oscillatory frequency (kHz)	$f = 2000 \cdot I_c^{0.2} \cdot U_e^{-0.8} \pm 10 \% = 21.43 \text{ kHz} \pm 10 \%$	
	Measured oscillatory frequency (kHz)	10.6 kHz 10.6 kHz	P
	Factor y	1.1	P
	Behaviour and condition during and after the test:		
	- no permanent arcing		P
	- no flash-over between poles		P
	- no blowing of the fusible element in the earth circuit		P
	- no welding of the contacts		P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		P
9.3.3.6	Operational performance capability:		
	Type of product	GMC-6M GMC-6M	
	utilization category	AC-4 AC-3	
	rated operational voltage U_e (V)	440 V 690 V	
	rated operational current I_e (A) or power (kW)	6 A 4 A	
	Conditions, make/break operations:		
	- test voltage (V) $U/U_e = 1,05$	L1: 473.2 L1: 750.8 L2: 477.2 L2: 758.3 L3: 481.7 L3: 757.8	
	- test current (A) $I/I_e =$	L1: 38.0 L1: 10.4 L2: 37.0 L2: 10.4 L3: 36.9 L3: 10.4	
	- power factor/time constant	L1: 0.45 L1: 0.49 L2: 0.46 L2: 0.50 L3: 0.48 L3: 0.50	
	- on-time (ms)	50 ms 50 ms	
	- off-time (s)	10 s 10 s	
	- number of operations	<input type="checkbox"/> 6000 make <input checked="" type="checkbox"/> 6000 make/ break	
	Number of operation energized simultaneously	10	
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		

IEC 60947-4-1				
Clause	Requirement + Test	Result - Remark		Verdict
	oscillatory frequency (kHz)	$f = 2000 \cdot I_c^{0.2} \cdot U_e^{-0.8} \pm 10 \% = 21.43 \text{ kHz} \pm 10 \%$		—
	Measured oscillatory frequency (kHz)	10.6 kHz	10.6 kHz	
	Factor γ	1.1		
	Behaviour and condition during and after the test:			P
	- no permanent arcing			P
	- no flash-over between poles			P
	- no blowing of the fusible element in the earth circuit			P
	- no welding of the contacts			P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control			P
8.3.3.4	Dielectric verification			
	test voltage (2 U_i), min 1000 V for 5 s. (V)	U test: <u>1 880</u> V	U test: <u>2 380</u> V	
	No flashover or breakdown			P
8.3.3.5	Leakage current equipment suitable for isolation			
	test voltage (1,1 U_e) (V)			P
	Leakage current: $\leq 2 \text{ mA /pole}$			P
9.3.3.5	Making and breaking capacity GMC-12M			
	Conditions, make operations only.....			
	Type of product	GMC-12M	GMC-12M	
	utilization category	AC-3	AC-3	
	Control voltage 25 times at 110% and 25 times at 85% for AC-3 and AC-4			
	rated operational voltage U_e (V) :	440 V	690 V	
	rated operational current I_e (A) or power (kW):	12 A	5 A	
	- test voltage (V) $U/U_e = 1,05$	L1: 471.8 L2: 476.6 L3: 477.9	L1: 751.2 L2: 756.4 L3: 757.6	
	- test current (A) $I/I_e = \underline{\hspace{1cm}}$	L1: 126.5 L2: 123.1 L3: 124.3	L1: 54.3 L2: 53.4 L3: 53.1	

IEC 60947-4-1				
Clause	Requirement + Test	Result - Remark		Verdict
	- power factor/time constant	L1: 0.43 L2: 0.44 L3: 0.47	L1: 0.45 L2: 0.45 L3: 0.47	
	- on-time (ms)	50 ms	50 ms	
	- off-time (s)	10 s	10 s	
	- number of make operations	50	50	
	Behaviour and condition during and after the test:			
	- no permanent arcing			P
	- no flash-over between poles			P
	- no blowing of the fusible element in the earth circuit			P
	- no welding of the contacts			P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control			P
	Conditions, make/break operations only			P
	Type of product	GMC-12M	GMC-12M	P
	utilization category	AC-3	AC-3	
	rated operational voltage U_e (V)	440 V	690 V	
	rated operational current I_e (A) or power (kW)	12 A	5 A	
	For starters incorporated two contactors, 2 contactor shall be used with the following sequence: Close A – open A – close B – open B- off period			P
	- test voltage (V) $U/U_e = 1,05$	L1: 472.5 L2: 477.2 L3: 488.6	L1: 752.7 L2: 759.7 L3: 759.7	—
	- test current (A) $I/I_e =$ _____	L1: 102.1 L2: 100.6 L3: 99.9	L1: 43.9 L2: 42.9 L3: 43.1	
	- power factor/time constant	L1: 0.45 L2: 0.45 L3: 0.47	L1: 0.46 L2: 0.47 L3: 0.49	
	- on-time (ms)	50 ms	50 ms	
	- off-time (s)	10 s	10 s	
	- number of operations	<input type="checkbox"/> 50 make <input checked="" type="checkbox"/> 50 make/ break		
	Number of operation energized simultaneously	10		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		
	oscillatory frequency (kHz)	$f = 2000 \cdot I_c^{0.2} \cdot U_e^{-0.8} \pm 10 \% = 22.41 \text{ kHz} \pm 10 \%$	
	Measured oscillatory frequency (kHz)	10.9 kHz 10.6 kHz	P
	Factor y	1.1	P
	Behaviour and condition during and after the test:		
	- no permanent arcing		P
	- no flash-over between poles		P
	- no blowing of the fusible element in the earth circuit		P
	- no welding of the contacts		P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		P
9.3.3.6	Operational performance capability:		
	Type of product	GMC-12M GMC-12M	
	utilization category	AC-4 AC-3	
	rated operational voltage U_e (V)	440 V 690 V	
	rated operational current I_e (A) or power (kW)	9 A 5 A	
	Conditions, make/break operations:		
	- test voltage (V) $U/U_e = 1,05$	L1: 472.0 L1: 750.8 L2: 477.0 L2: 758.3 L3: 477.9 L3: 757.8	
	- test current (A) $I/I_e =$	L1: 58.5 L1: 10.4 L2: 58.3 L2: 10.4 L3: 57.6 L3: 10.4	
	- power factor/time constant	L1: 0.45 L1: 0.49 L2: 0.46 L2: 0.50 L3: 0.47 L3: 0.51	
	- on-time (ms)	50 ms 50 ms	
	- off-time (s)	10 s 10 s	
	- number of operations	<input type="checkbox"/> 6000 make <input checked="" type="checkbox"/> 6000 make/ break	
	Number of operation energized simultaneously	10	
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		

IEC 60947-4-1				
Clause	Requirement + Test	Result - Remark		Verdict
	oscillatory frequency (kHz)	$f = 2000 \cdot I_c^{0.2} \cdot U_e^{-0.8} \pm 10 \% = 22.41 \text{ kHz} \pm 10 \%$		—
	Measured oscillatory frequency (kHz)	10.9 kHz	10.6 kHz	
	Factor γ	1.1		
	Behaviour and condition during and after the test:			P
	- no permanent arcing			P
	- no flash-over between poles			P
	- no blowing of the fusible element in the earth circuit			P
	- no welding of the contacts			P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control			P
8.3.3.4	Dielectric verification			
	test voltage (2 U_i), min 1000 V for 5 s. (V)	U test: <u>1 880</u> V	U test: <u>2 380</u> V	
	No flashover or breakdown			P
8.3.3.5	Leakage current equipment suitable for isolation			
	test voltage (1,1 U_e) (V)			P
	Leakage current: $\leq 2 \text{ mA /pole}$			P
9.3.3.5	Making and breaking capacity GMC-16M			
	Conditions, make operations only.....			
	Type of product	GMC-16M		
	utilization category	AC-3	AC-3	
	Control voltage 25 times at 110% and 25 times at 85% for AC-3 and AC-4			
	rated operational voltage U_e (V) :	240 V	440V	
	rated operational current I_e (A) or power (kW):	18 A	16 A	
	- test voltage (V) $U/U_e = 1,05$	L1: 253.0 L2: 257.2 L3: 257.0	L1: 472.7 L2: 477.0 L3: 474.4	
	- test current (A) $I/I_e = \underline{\hspace{1cm}}$	L1: 188.5 L2: 184.8 L3: 185.9	L1: 168.7 L2: 164.6 L3: 165.1	

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Clause	Requirement + Test	Result - Remark		Verdict
	- power factor/time constant	L1: 0.45 L2: 0.46 L3: 0.48	L1: 0.44 L2: 0.44 L3: 0.47	
	- on-time (ms)	50 ms	50 ms	
	- off-time (s)	10 s	10 s	
	- number of make operations	50	50	
	Behaviour and condition during and after the test:			
	- no permanent arcing			P
	- no flash-over between poles			P
	- no blowing of the fusible element in the earth circuit			P
	- no welding of the contacts			P
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control			P
	Conditions, make/break operations only			P
	Type of product	GMC-16M		P
	utilization category	AC-3	AC-3	
	rated operational voltage Ue (V)	240 V	440 V	
	rated operational current Ie (A) or power (kW)	18 A	16 A	
	For starters incorporated two contactors, 2 contactor shall be used with the following sequence: Close A – open A – close B – open B- off period			P
	- test voltage (V) U/Ue = 1,05	L1: 253.6 L2: 257.4 L3: 257.5	L1: 474.6 L2: 477.9 L3: 476.6	—
	- test current (A) I/Ie = _____	L1: 149.3 L2: 146.3 L3: 147.8	L1: 132.4 L2: 128.4 L3: 130.1	
	- power factor/time constant	L1: 0.45 L2: 0.46 L3: 0.48	L1: 0.44 L2: 0.45 L3: 0.47	
	- on-time (ms)	50 ms	50 ms	
	- off-time (s)	10 s	10 s	
	- number of operations	<input type="checkbox"/> 50 make <input checked="" type="checkbox"/> 50 make/ break		
	Number of operation energized simultaneously	10		

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Clause	Requirement + Test	Result - Remark	Verdict
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		
	oscillatory frequency (kHz)	$f = 2000 \cdot I_c^{0.2} \cdot U_e^{-0.8} \pm 10 \% = 22.41 \text{ kHz} \pm 10 \%$	
	Measured oscillatory frequency (kHz)	9.0 kHz 9.0 kHz	
	Factor y	1.1	
	Behaviour and condition during and after the test:		
	- no permanent arcing		
	- no flash-over between poles		
	- no blowing of the fusible element in the earth circuit		
	- no welding of the contacts		
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		
9.3.3.6	Operational performance capability:		
	Type of product	GMC-16M	
	utilization category	AC-4 AC-4	
	rated operational voltage U_e (V)	240 V 440V	
	rated operational current I_e (A) or power (kW)	12 A 11 A	
	Conditions, make/break operations:		
	- test voltage (V) $U/U_e = 1,05$	L1: 254.3 L1: 474.2 L2: 257.5 L2: 477.9 L3: 258.2 L3: 476.3	
	- test current (A) $I/I_e =$	L1: 78.4 L1: 69.8 L2: 77.5 L2: 68.9 L3: 77.6 L3: 68.9	
	- power factor/time constant	L1: 0.46 L1: 0.46 L2: 0.47 L2: 0.46 L3: 0.48 L3: 0.48	
	- on-time (ms)	50 ms 50 ms	
	- off-time (s)	10 s 10 s	
	- number of operations	<input type="checkbox"/> 6000 make <input checked="" type="checkbox"/> 6000 make/ break	
	Number of operation energized simultaneously	10	
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		

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Clause	Requirement + Test	Result - Remark		Verdict
	oscillatory frequency (kHz)	f = 2000*Ic ^{0.2} *Ue ^{-0.8} ± 10 % = 22.41 kHz ± 10 %		—
	Measured oscillatory frequency (kHz)	10.9 kHz	10.6 kHz	
	Factor y	1.1		
	Behaviour and condition during and after the test:			
	- no permanent arcing			
	- no flash-over between poles			
	- no blowing of the fusible element in the earth circuit			
	- no welding of the contacts			
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control			
8.3.3.4	Dielectric verification			
	test voltage (2 Ui), min 1000 V for 5 s. (V)	U test: <u>1 880</u> V	U test: <u>2 380</u> V	
	No flashover or breakdown			
8.3.3.5	Leakage current equipment suitable for isolation			
	test voltage (1,1 Ue) (V)			
	Leakage current: ≤ 2 mA /pole			

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Clause	Requirement + Test	Result - Remark		Verdict														
9.3.1.c	TEST SEQUENCE III																	
	- Performance under short-circuit conditions (Clause 9.3.4)			P														
9.3.4	Performance under short-circuit conditions																	
	Contactor or starter and the associated SCPD, or combination or protected starter are subjected to tests 9.3.4.2.1 and 9.3.4.2.2.			P														
	Maximum Ie and maximum Ue for AC-3 are covered			P														
	Sub clause 8.3.4.1.2 of part 1 applies except that, for type “1” co-ordination, the fusible element F and resistor are replaced by a solid 6 mm ² wire of 1,2 m to 1,8 m length connected to the neutral, or with the agreement of the manufacturer, to one of the phases	<input type="checkbox"/> neutral <input checked="" type="checkbox"/> phase S		P														
	Rated control supply voltage	<table><tr><th>Type</th><th>AC</th></tr><tr><td>GMC-6M</td><td>550 V / 60 Hz</td></tr><tr><td>GMC-16M</td><td>240 V / 60 Hz</td></tr><tr><td>GMC-6MF</td><td>240 V / 60 Hz</td></tr><tr><th>Type</th><th>DC</th></tr><tr><td>GMD-6MC</td><td>240 V</td></tr><tr><td>GMD-6MP</td><td>240 V</td></tr></table>		Type	AC	GMC-6M	550 V / 60 Hz	GMC-16M	240 V / 60 Hz	GMC-6MF	240 V / 60 Hz	Type	DC	GMD-6MC	240 V	GMD-6MP	240 V	P
Type	AC																	
GMC-6M	550 V / 60 Hz																	
GMC-16M	240 V / 60 Hz																	
GMC-6MF	240 V / 60 Hz																	
Type	DC																	
GMD-6MC	240 V																	
GMD-6MP	240 V																	
9.3.4.2.1	Test at the prospective current "r":																	
	type of product	GMC-6M	GMC-16M															
	test circuit, figure 9, 10, 11, 12.....																	
	type of SCPD	Fuse gL/gG	Fuse gL/gG															
	ratings of SCPD, co-ordination type 1	-	-															
	ratings of SCPD, co-ordination type 2	20 A	20 A															
	rated operational current Ie (A) AC-3	4 A	16 A															
	rated operational voltage (V)	690 V	240 V															
	prospective current "r" (kA) (table 12).....	1 kA	3 kA															
	Wire size (mm ²) type 1	_____ mm ²	_____ mm ²	N/A														
	Wire size (AWG) type 2	18 AWG	12 AWG	P														

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Clause	Requirement + Test	Result - Remark			Verdict
	test voltage (V)	L1: 744.6 L2: 761.2 L3: 747.4	L1: 257.1 L2: 259.4 L3: 259.1		
	r.m.s. test current (A)	L1: 1.00 L2: 1.04 L3: 1.00	L1: 3.04 L2: 3.06 L3: 3.07		
	peak current (A)	L1: 0.959 L2: 1.107 L3: 1.113	L1: 0.456 L2: 0.167 L3: 1.403		
	power factor	L1: 0.91 L2: 0.94 L3: 0.92	L1: 0.81 L2: 0.89 L3: 0.87		P
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I ² dt and I _p (A ² s / A)	L1: 2.105 L2: 1.792 L3: 1.560	L1: 1.589 L2: 0.753 L3: 0.865		
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I ² dt and I _p (A ² s / A)	L1: 1.695 L2: 2.043 L3: 0.254	L1: 1.452 L2: 1.105 L3: 0.845		
9.3.4.2.1	Test at the prospective current "r":				
	type of product	GMD-6MC	GMC-6MF	GMD-6MP	
	test circuit, figure 9, 10, 11, 12.....	Figure 11	Figure 11	Figure 11	
	type of SCPD	Fuse gL/gG	Fuse gL/gG	Fuse gL/gG	
	ratings of SCPD, co-ordination type 1	-	-	-	
	ratings of SCPD, co-ordination type 2	20 A	20 A	20 A	
	rated operational current I _e (A) AC-3	4 A	4 A	4 A	
	rated operational voltage (V)	690 V	690 V	690 V	
	prospective current "r" (kA) (table 12).....	1 kA	1 kA	1 kA	
	Wire size (mm ²) type 1	_____ mm ²	_____ mm ²	_____ mm ²	N/A
	Wire size (mm ²) type 2	18 AWG	18 AWG	18 AWG	P

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Clause	Requirement + Test	Result - Remark			Verdict
	test voltage (V)	L1: 744.6 L2: 761.2 L3: 747.4	L1: 744.6 L2: 761.2 L3: 747.4	L1: 744.6 L2: 761.2 L3: 747.4	
	r.m.s. test current (A)	L1: 1.00 L2: 1.04 L3: 1.00	L1: 1.00 L2: 1.04 L3: 1.00	L1: 1.00 L2: 1.04 L3: 1.00	
	peak current (A)	L1: 1.088 L2: 0.923 L3: 1.083	L1: 0.898 L2: 1.730 L3: 0.944	L1: 0.937 L2: 1.336 L3: 1.276	
	power factor	L1: 0.91 L2: 0.94 L3: 0.92	L1: 0.91 L2: 0.94 L3: 0.92	L1: 0.91 L2: 0.94 L3: 0.92	P
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2dt and I_p (A ² s / A)	L1: 1.428 L2: 1.023 L3: 1.189	L1: 0.902 L2: 2.999 L3: 0.757	L1: 1.490 L2: 2.162 L3: 2.100	
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2dt and I_p (A ² s / A)	L1: 0.341 L2: 3.248 L3: 0.754	L1: 1.859 L2: 2.944 L3: 0.956	L1: 1.349 L2: 1.987 L3: 0.224	
9.3.4.2.3	Behaviour of the equipment during the test				P
	Both types of co-ordination (all devices):				P
	A - the fault current has been successfully interrupted by the SCPD, the combination starter or the combination switching device and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted				P
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover. Degree of protection by the enclosure is not less than IP2X				P
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals				P
	D – there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired				P
	Both types of co-ordination (combination starters and protected starters only):				P
	E – the circuit breaker or switch is capable of being opened manually by its operating means				P
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part				P

IEC 60947-4-1															
Clause	Requirement + Test	Result - Remark	Verdict												
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination starter, the combination switching device, the protected starter or the protected switching device is employed, the circuit breaker shall be tested to trip as follows:														
	a) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N/A												
	b) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N/A												
	Type 1 co-ordination (all devices):		N/A												
	H - there has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable. The starter may be inoperative after each operation. The starter shall there fore be inspected and the contactor and/or the overload relay and the release of the circuit-breaker shall be reset if necessary and, in the case of fuse protection, all fuse-links shall be replaced.		N/A												
	Type 1 co-ordination (combination and protected starters only):		N/A												
	I - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 is verified after each operation (at currents “r” and “Iq” by a dielectric test on the complete unit under test (SCPD plus contctor/starter but before replacement of parts). The test voltage shall be applied to the incoming supply terminals, with the switch or circuit-breaker in open position, as follows:														
	I - dielectric verification test voltage (2 Ue) for 5 s (V) but not less than 1000V:	<div>U test<table><tr><th>Type</th><th>U test Voltage</th></tr><tr><td>GMC-6M</td><td>1 380 V</td></tr><tr><td>GMC-6MF</td><td>1 380 V</td></tr><tr><td>GMC-16M</td><td>1 000 V</td></tr><tr><td>GMD-6MC</td><td>1 380 V</td></tr><tr><td>GMD-6MP</td><td>1 380 V</td></tr></table></div>	Type	U test Voltage	GMC-6M	1 380 V	GMC-6MF	1 380 V	GMC-16M	1 000 V	GMD-6MC	1 380 V	GMD-6MP	1 380 V	
Type	U test Voltage														
GMC-6M	1 380 V														
GMC-6MF	1 380 V														
GMC-16M	1 000 V														
GMD-6MC	1 380 V														
GMD-6MP	1 380 V														
	- between each pole and all other poles connected to the frame of the starter		N/A												
	- between all live parts of all poles connected together and the frame of the starter		N/A												
	- between the terminals of the line side connected together and terminals of the other side connected together		N/A												

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in open position, at test voltage of 1,1 Ue and shall not exceed 6 mA	Utest: _____ V L1: _____ mA L2: _____ mA L3: _____ mA	
	Type 2 co-ordination (all devices)		P
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts is permitted, if they are easily separated (e.g. by a screwdriver) without significant deformation, but no replacement of parts is permitted during the test, except that , in case of fuse protection, all fuse shall be replaced.	Contacts welded <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	P
	In the case of welded contact as described above, the functionality of the device shall be verified by carrying out 10 operations under the conditions of table 8 for the applicable utilization category.		N/A
	Operational performance capability (9.3.3.6):		
	Type of product :		
	utilization category :		
	rated operational voltage Ue (V) :		
	rated operational current Ie (A) or power (kW) :		
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,05 (V) :		
	- test current (A) I/Ie = 6 :		
	- power factor/time constant :		
	- on-time (ms) :		
	- off-time (s) :		
	- number of make/break operations :	10 cycles	
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		
	oscillatory frequency (kHz) :		N/A
	Measured oscillatory frequency (kHz) :		N/A
	Factor y :		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A
	K The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.		P
	L The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 shall be verified by a dielectric test on the contactor , starter, the combination starter, the combination switching device , the protected starter or protected switching device as follows:		P
	L - dielectric verification test voltage (2 Ue) for 5 s (V) but not less than 1000V :	U test: 1000V	P
	- between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation		P
	- between each pole of the main circuit and the other poles connected together and to the enclosure ore mounting plate with the contacts in all normal positions of operation		P
	- between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit - the other circuits - the exposed conductive parts - the enclosure or mounting plate		P
	In case of combination starters, combination switching devices, protected starters and protecting switching devices, additional tests according to 8.3.3.4.1, item 3) of part 1 shall be made as follows:		N/A
	Dielectric verification test voltage according table 12A of part 1) for 5 s (V)	U test: _____ V	N/A
	across the main poles of the device with the contacts of the switch or of the circuit- breaker open and the contacts of the starter closed		N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in the open position, at a test voltage of 1,1 Ue and shall not exceed 2 mA	U test: _____ V L1: _____ mA L1: _____ mA L1: _____ mA	N/A
9.3.4.2.2	Test at the rated conditional short-circuit current "Iq"		
	Type of product		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Test circuit, figure 9, 10, 11, 12		
	type of SCPD		
	ratings of SCPD, co-ordination type 1		
	ratings of SCPD, co-ordination type 2		
	rated operational current I_e (A) AC-3		
	rated operational voltage (V)		
	prospective current " I_q " (kA)		
	Wire size (mm^2) type 1	_____ mm^2	N/A
	Wire size (mm^2) type 2	_____ mm^2	N/A
	test voltage (V)		
	r.m.s. test current (A)		
	peak current (A)	L1: L2: L3:	
	power factor		N/A
	1. one breaking operation of SCPD with all the switching devices closed prior to the test I^2t and I_p ($\text{A}^2\text{s} / \text{A}$)		
	2. one breaking operation of SCPD by closing the contactor or starter on to the short-circuit I^2t and I_p ($\text{A}^2\text{s} / \text{A}$)		
	3. one breaking operation of SCPD by closing the switching device on to the short-circuit I^2t and I_p ($\text{A}^2\text{s} / \text{A}$)	L1: L2: L3:	
9.4.2.3	Behaviour of the equipment during the test		N/A
	Both types of co-ordination (all devices):		N/A
	A - the fault current has been successfully interrupted by the SCPD, the combination starter or the combination switching device and the fuse or fusible element, or solid connection between the enclosure and supply shall not have melted		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	B - the door or cover of the enclosure has not been blown open and it is possible to open the door or cover. Degree of protection by the enclosure is not less than IP2X		N/A
	C - there is no damage to the conductors or terminals and the conductors have not been separated from the terminals		N/A
	D – there is no cracking or breaking of an insulating base to the extent that the integrity of mounting of a live part is impaired		N/A
	Both types of co-ordination (combination starters and protected starters only):		N/A
	E – the circuit breaker or switch is capable of being opened manually by its operating means		N/A
	F - neither end of the SCPD is completely separated from its mounting means to an exposed conductive part		N/A
	G - if a circuit breaker with rated ultimate short-circuit breaking capacity less than the rated conditional short-circuit current assigned to the combination starter, the combination switching device, the protected starter or the protected switching device is employed, the circuit breaker shall be tested to trip as follows:		
	a) circuit breaker with instantaneous trip relays or releases, at 120% of the trip current		N/A
	b) circuit breaker with overload relays or releases, at 250% of the rated current of the circuit breaker		N/A
	Type 1 co-ordination (all devices):		N/A
	H - there has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable. The starter may be inoperative after each operation. The starter shall there fore be inspected and the contactor and/or the overload relay and the release of the circuit-breaker shall be reset if necessary and, in the case of fuse protection, all fuse-links shall be replaced.		N/A
	Type 1 co-ordination (combination and protected starters only):		N/A
	I - The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 is verified after each operation (at currents “r” and “Iq” by a dielectric test on the complete unit under test (SCPD plus contactor/starter but before replacement of parts). The test voltage shall be applied to the incoming supply terminals, with the switch or circuit-breaker in open position, as follows:		
	I - dielectric verification test voltage (2 Ue) for 5 s (V) but not less than 1000V	U test: _____ V	
	- between each pole and all other poles connected to the frame of the starter		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- between all live parts of all poles connected together and the frame of the starter		N/A
	- between the terminals of the line side connected together and terminals of the other side connected together		N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in open position, at test voltage of 1,1 Ue and shall not exceed 6 mA	Utest: _____ V L1: _____ mA L2: _____ mA L3: _____ mA	
	Type 2 co-ordination (all devices)		N/A
	J - no damage to the overload relay or other parts has occurred, except that welding of contactor or starter contacts is permitted, if they are easily separated (e.g. by a screwdriver) without significant deformation, but no replacement of parts is permitted during the test, except that, in case of fuse protection, all fuse shall be replaced.	Contacts welded <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	N/A
	In the case of welded contact as described above, the functionality of the device shall be verified by carrying out 10 operations under the conditions of table 8 for the applicable utilization category.		N/A
	Operational performance capability (9.3.3.6):		
	Type of product :		
	utilization category :		
	rated operational voltage Ue (V) :		
	rated operational current Ie (A) or power (kW) :		
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,05 (V) :		
	- test current (A) I/Ie = _____ :		
	- power factor/time constant :		
	- on-time (ms) :		
	- off-time (s) :		
	- number of make/break operations :		
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		
	oscillatory frequency (kHz) :		N/A
	Measured oscillatory frequency (kHz) :		N/A
	Factor y :		N/A
	Behaviour and condition during and after the test:		
	- no permanent arcing		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A
	K The tripping of the overload relay shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics, according to 5.7.5, both before and after the short-circuit test.		N/A
	L The adequacy of insulation in according with 8.3.3.4.1, item 4), of part 1 shall be verified by a dielectric test on the contactor , starter, the combination starter, the combination switching device , the protected starter or protected switching device as follows:		N/A
	L - dielectric verification test voltage (2 Ue) for 5 s (V) but not less than 1000V :	U test: _____ V	N/A
	- between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation		N/A
	- between each pole of the main circuit and the other poles connected together and to the enclosure ore mounting plate with the contacts in all normal positions of operation		N/A
	- between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit - the other circuits - the exposed conductive parts - the enclosure or mounting plate		N/A
	In case of combination starters, combination switching devices, protected starters and protecting switching devices, additional tests according to 8.3.3.4.1, item 3) of part 1 shall be made as follows:		N/A
	Dielectric verification test voltage according table 12A of part 1) for 5 s (V)	U test: _____ V	N/A
	across the main poles of the device with the contacts of the switch or of the circuit- breaker open and the contacts of the starter closed		N/A
	For equipment suitable for isolation, the leakage current shall be measured through each pole, with the contacts in the open position, at a test voltage of 1,1 Ue and shall not exceed 2 mA	U test: _____ V L1: _____ mA L2: _____ mA L3: _____ mA	N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

9.3.1.d	TEST SEQUENCE IV		
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	- Verification of ability to withstand overload currents: Clause 9.3.5 (applicable for contactors only)		P
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9.3.5	Verification of ability to withstand overload currents	GMC-6M	
	Overload current withstand capability of contactors AC-3 and AC-4:		P
	ambient temperature (°C)	23 °C	—
	rated operational current I _e (A) max. AC-3	7 A	—
	test current (I _e) (A)	56 A	—
	duration of test: 10 s	10 s	—
	After the test, the contactor shall be substantially in the same condition as before the test (visual inspection)		P
9.3.5	Verification of ability to withstand overload currents	GMC-6MC	
	Overload current withstand capability of contactors AC-3 and AC-4:		P
	ambient temperature (°C)	22 °C	—
	rated operational current I _e (A) max. AC-3	7 A	—
	test current (I _e) (A)	56 A	—
	duration of test: 10 s	10 s	—
	After the test, the contactor shall be substantially in the same condition as before the test (visual inspection)		P
9.3.5	Verification of ability to withstand overload currents	GMC-6MF	
	Overload current withstand capability of contactors AC-3 and AC-4:		P
	ambient temperature (°C)	22 °C	—
	rated operational current I _e (A) max. AC-3	7 A	—
	test current (I _e) (A)	56 A	—
	duration of test: 10 s	10 s	—
	After the test, the contactor shall be substantially in the same condition as before the test (visual inspection)		P
9.3.5	Verification of ability to withstand overload currents	GMD-6MP	
	Overload current withstand capability of contactors AC-3 and AC-4:		P

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	ambient temperature (°C)	22 °C	—
	rated operational current I _e (A) max. AC-3	7 A	—
	test current (I _e) (A)	56 A	—
	duration of test: 10 s	10 s	—
	After the test, the contactor shall be substantially in the same condition as before the test (visual inspection)		P
9.3.5	Verification of ability to withstand overload currents GMC-12M		
	Overload current withstand capability of contactors AC-3 and AC-4:		P
	ambient temperature (°C)	23 °C	—
	rated operational current I _e (A) max. AC-3	12 A	—
	test current (I _e) (A)	96 A	—
	duration of test: 10 s	10 s	—
	After the test, the contactor shall be substantially in the same condition as before the test (visual inspection)		P
9.3.5	Verification of ability to withstand overload currents GMC-16M		
	Overload current withstand capability of contactors AC-3 and AC-4:		P
	ambient temperature (°C)	23 °C	—
	rated operational current I _e (A) max. AC-3	18 A	—
	test current (I _e) (A)	144 A	—
	duration of test: 10 s	10 s	—
	After the test, the contactor shall be substantially in the same condition as before the test (visual inspection)		P

9.3.1.e	TEST SEQUENCE V	
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	- Verification of mechanical properties of terminals: Clause 8.2.4 - Verification of degrees of protection of enclosed contactors and starters (see annex C of part 1)	P
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IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
8.2.4 part 1	Verification of mechanical properties of terminals		
		See construction	P
Annex C Part 1	Verification of degrees of protection of enclosed contactors and starters		
		See construction	P

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

	EMC tests	
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	Sub. Clause 8.3.2.1, 8.3.2.3 and 8.3.2.4 of part 1 apply		N/A
	In agreement with the manufacturer one EMC test or all EMC may be conducted on one sample		N/A
	The test sample shall be in the open or closed position, whichever is the worse, and shall be operated with the rated supply.		N/A

9.4	ELECTROMAGNETIC COMPATIBILITY TESTS	N/A
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9.4.2	Immunity (for equipment incorporating electronic circuits)		N/A
	Tests of table 13 : Special requirements are specified in clause 9.4.2.1 to 9.4.2.6		N/A
9.4.2.1	Performance of the test sample during and after the test		N/A
	Unless otherwise specified, performance criterion 2 applies, see clause 8.3.2.2	Criterion : _____	N/A
9.4.2.2	Electrostatic discharges		
	The test shall be conducted using the method of IEC 61000-4-2		
	No loss of performance during the tests	See _____	N/A
9.4.2.3	Electromagnetic field		N/A
	The test shall be conducted using the method of IEC 61000-4-3		N/A
	No loss of performance during the tests	See _____	N/A
9.4.2.4	Fast transient bursts		N/A
	The test shall be conducted using the method of IEC 61000-4-4		N/A
	No loss of performance during the tests	See _____	N/A
9.4.2.5	Surges (1,2/50 μs – 8/20 μs)		N/A
	The test shall be conducted using the method of IEC 61000-4-5		N/A
	No loss of performance during the tests	See _____	N/A
9.4.2.6	Harmonics		N/A
	Under consideration		N/A

9.4.3	Emission	N/A
	Tests of table 14 and 15 : Special requirements are specified in clause 9.4.3.1 to 9.4.3.2	N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	For equipment designed for environment A, a suitable warning shall be given to the user (for example in the instruction manual) stipulating that the use of this equipment in environment B may cause radio interference in which case the user may be required to employ additional mitigation methods		N/A
9.4.3.1	Conducted radio-frequency emission tests		N/A
	The test shall be conducted using the method of CISPR 11		N/A
	The equipment shall not exceed the levels given in table 14 and no loss of performance during the tests	See _____	N/A
9.4.3.2	Radiated radio-frequency emission tests		N/A
	The test shall be conducted using the method of CISPR 11		N/A
	The equipment shall not exceed the levels given in table 15 and no loss of performance during the tests	See _____	N/A

	TEST SEQUENCE Annex B	
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	-Mechanical durability B2 Single 8 test Double 3 test -Electrical durability B3	N/A
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Annex B2	Mechanical durability		
	Single 8 test	See	N/A
	Double 3 test	See	N/A
Annex B3	Electrical durability		
		See	N/A
	Electrical durability:		N/A
	Type of product :		N/A
	utilization category :		N/A
	rated operational voltage Ue (Vac) :		N/A
	rated operational current Ie (A) or power (kW) :		N/A
	Conditions, make/break operations:		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- test voltage $U/U_e = 1,05$	L1: L2: L3:	N/A
	- test current $I/I_e =$	L1: L2: L3:	N/A
	- power factor/time constant	L1: L2: L3:	N/A
	- operating cycles (ops/h)		N/A
	- on-time (ms)		N/A
	- number of make/break operations		N/A
	Characteristic of transient recovery voltage for AC-3 and AC-4 only:		N/A
	oscillatory frequency (kHz)		N/A
	Measured oscillatory frequency (kHz)		N/A
	Factor y		N/A
	Behaviour and condition during and after the test:		N/A
	- no permanent arcing		N/A
	- no flash-over between poles		N/A
	- no blowing of the fusible element in the earth circuit		N/A
	- no welding of the contacts		N/A
	- the contacts shall operate when the contactor or starter is switched by the applicable method of control		N/A
8.3.3.4.1 4) b) part 1	Dielectric verification		N/A
	test voltage (2 U_e , min 1000V) for 5 sec. (Vac)	U test: _____ Vac	N/A
	No flashover or breakdown		N/A
9.3.3.2	Operating limits		N/A
Annex B4	Co-ordination at the crossover current between the starter and associated SCPD		
B.4.5	Verification of co-ordination at the crossover current by an indirect method		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The indirect method consists in verifying on a diagram (see Figure B.1) that the following conditions for the verification of co-ordination at the crossover current are met:		
	- the time-current characteristic of the overload relay/release, starting from cold state, supplied by the manufacturer, shall indicate how the tripping time varies with the current up to a value of at least I_{co} ; this curve has to lie below the time-current characteristic of the SCPD up to I_{co} ;		N/A
	I_{cd} of the starter, tested as in B.4.5.1, shall be higher than I_{co} ;		N/A
	- the time-current withstand characteristic of the contactor, tested as in B.4.5.2, shall be above the time-current characteristic (starting from cold state) of the overload relay up to I_{co} .		N/A
B.4.5.1	Test for I_{cd}		
	The contactor or starter shall make and break the test current (I_{cd}) for the number of operating cycles given in Table B.2. This is made without the SCPD in the circuit.		N/A
	During the test, there shall be no permanent arcing, no flash-over between poles, no blowing of the fusible element in the earth circuit (see 9.3.4.1.2) and no welding of contacts;		N/A
	after the test the contacts shall operate correctly when the contactor or starter is switched by the applicable method of control		N/A
	the dielectric properties of the contactors and starters shall be verified by a dielectric test on the contactor or starter using an essentially sinusoidal test voltage of twice the rated operational voltage U_e used for the I_{cd} test, with a minimum of 1 000 V. The test voltage shall be applied for 60 s, as specified in 8.3.3.4.1 of IEC 60947-1, items 2) c) i) and 2) c) ii.		N/A
B.4.5.2	Time –current characteristic withstand capability		
	This characteristic is issued by the manufacturer and the values are obtained according to the test procedure specified in 9.3.5 but with combinations of overload currents and durations to establish the characteristic at least up to I_{co} , in addition to those stated in 8.2.4.4.		
	This characteristic is valid for overload currents, starting with the contactor at room temperature. The minimum cooling duration required by the contactor between two such overload tests should be stated by the manufacturer.		

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.5	Verification of ability to withstand overload currents		
	Overload current withstand capability of contactors AC-3 and AC-4:		N/A
	ambient temperature (°C)		—
	rated operational current I _e (A) max. AC-3		—
	test current (I _e) (A)		—
	duration of test: 10 s		—
	After the test, the contactor shall be substantially in the same condition as before the test (visual inspection)		N/A

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TEST SEQUENCE Annex F		
	Requirements for auxiliary contact linked with power contact (mirror contact)		N/A
		See	N/A
F 7.2 a)	Contact		N/A
F 7.2 a)	Contacts kept in closed position by		N/A
	Measurement method		N/A
Table F.1	Test voltage (kV)		N/A
	Type of products:		N/A
	with		N/A
	with		N/A
F 7.3	Test after conventional operational performance		N/A
	with		N/A
	with		N/A

	TEST SEQUENCE Annex H		
	Extended functions within electronic overload relays		N/A
H.3	Type of extended function	<input type="checkbox"/> electronic overload relay with residual current (earth fault) function <input type="checkbox"/> electronic overload relay with current imbalance detection <input type="checkbox"/> electronic overload relay with voltage imbalance detection <input type="checkbox"/> electronic overload relay with phase reversal detection <input type="checkbox"/> electronic overload relay with over-voltage detection <input type="checkbox"/> electronic overload relay with under power detection	
H.4	Type of relays A type A electronic overload relay is one that will initiate opening of the switching device at all levels of fault current A type B overload relay is one that will not initiate opening of the switching device above a set current level of I_{ic} (inhibit current)	<input type="checkbox"/> type A <input type="checkbox"/> type B	

IEC 60947-4-1			
Clause	Requirement + Test	Result - Remark	Verdict
H.6	TESTS		N/A
H.6.1	Limits of operation of residual current sensing electronic relays type CI and CII (-A and -B)		N/A
	The limits of operation shall be in accordance with H.5.1 and verified as follows :		
	For overload relays with an adjustable residual current setting, the test shall be made at the minimum and at the maximum current setting		
	The test circuit shall be in accordance with Figure H1. The test shall be made at a power factor $\geq 0,8$ at any convenient voltage and any convenient current		
	The test circuit being calibrated at each of the values of the residual operating current specified in the table H.1. as applicable and the switch S1 being in the closed position, the residual current established by closing switch S2		
	For ground/earth fault relays type CII, the inhibit current shall be set to a value at least 30 % higher than the maximum ground/earth fault current setting.		
	Minimum setting : I _{test} $\leq 0,9$ times residual current setting : I _{test} 1,1 times residual current setting :	____ mA = ____ A, no tripping = ____ A, tripping at ____ ms (trip time(Tp): 10 < T _p \leq 1000ms	N/A
	Maximum setting : I _{test} $\leq 0,9$ times residual current setting : I _{test} 1,1 times residual current setting :	____ mA = ____ A, no tripping = ____ A, tripping at ____ ms (trip time(Tp): 10 < T _p \leq 1000ms	N/A
H.6.2	Limits of operation of residual current sensing electronic relays type CI and CII (-A and -B)		
	Minimum setting : I _{test} $\leq 0,9$ times residual current setting : I _{test} 1,1 times residual current setting :	____ mA = ____ A, no tripping = ____ A, tripping at ____ ms (trip time(Tp): 10 < T _p \leq 1000ms	N/A
	Maximum setting : I _{test} $\leq 0,9$ times residual current setting : I _{test} 1,1 times residual current setting :	____ mA = ____ A, no tripping = ____ A, tripping at ____ ms (trip time(Tp): 10 < T _p \leq 1000ms	N/A
	The limits of operation shall be in accordance with H.5.2 and verified as follows :		N/A
	The test circuit shall be made with a three-phase load in accordance with Figure H1. The test shall be made at a power factor $\geq 0,8$ at any convenient voltage and any convenient current		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For overload relays with an adjustable residual current setting, the test shall be made at the minimum residual current setting		N/A
	The test circuit being calibrated at the values of 95% of the inhibit current I_{ic} and the switch S1 being in the closed position, the residual current established by closing switch S2		N/A
	Minimum setting : Itest setting: 95% of the inhibit current I_{ic} : : Itest setting: 75% of the inhibit current I_{ic} :	_____ mA = _____ A, no tripping = _____ A, tripping at _____ ms	N/A
	For overload relays with an adjustable inhibit current setting I_{ic} , the test shall be made at the minimum and at the maximum I_{ic} , setting		N/A
	Minimum setting : Itest setting: 95% of the inhibit current I_{ic} : : Itest setting: 75% of the inhibit current I_{ic} :	_____ mA = _____ A, no tripping = _____ A, tripping at _____ ms	N/A
	Maximum setting : Itest setting: 95% of the inhibit current I_{ic} : : Itest setting: 75% of the inhibit current I_{ic} :	_____ mA = _____ A, no tripping = _____ A, tripping at _____ ms	N/A
H.6.3	Current imbalance relays		N/A
	The limits of operation shall be verified in accordance with H.5.5.		N/A
	Itest setting : >1,2 times the current asymmetry setting : Trip time < 120% of time setting :	= _____ A, tripping after _____ s	N/A
H.6.4	Voltage imbalance		N/A
	The limits of operation shall be verified in accordance with H.5.3.		N/A
	Utest setting : 1,0 times the voltage asymmetry setting : Trip time < 120% of time setting : Or Utest setting : >1,2 times the voltage asymmetry setting :	= _____ V, tripping after _____ s <input type="checkbox"/> prevent to close <input type="checkbox"/> did not prevent to close	N/A
H.6.5	Phase reversal relays		N/A
	The limits of operation shall be verified in accordance with H.5.4.		N/A
	Voltage sequence of the line side of the starter are the same as voltage sequence setting	The phase reversal relay permits to close the equipment	N/A
	After interchange of two phases	The phase reversal relay prevents closing of the equipment	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
H.6.6	Over voltage relays		N/A
	The limits of operation shall be verified in accordance with H.5.6.		N/A
	a) operating voltage: shall operated to open or prevent the closing if U supply > Uset or > 110 % Un or > time setting	U supply=____V U set =____V Time setting=____s	N/A
	b) operating time: time lag shall be measured from the instant when the voltage reaches the operating value until the instant when the relay or release actuates the device of the equipment	Time setting=____s Voltage operating Value =____V Time lag =____s	N/A
H.6.7	Under-power relays		N/A
	The limits of operation shall be verified in accordance with H.5.7		N/A
	An under-power relay shall operate to open the switching device at any value of time but no longer than 120 % of the time setting where the load power is under 0,8 times the underpower setting.		N/A
	TEST SEQUENCE Annex K		
	Procedure to determine data for electromechanical contactors used in functional safety applications.		N/A
		See	N/A
	TEST SEQUENCE Annex M (part 1)		
	Hot wire ignition (HWI) test		N/A
M.1.1	Five samples of each material shall be tested. The samples shall be 150 mm long by 13 mm wide, and of uniform thickness stated by the material manufacturer. Edges shall be free from burrs, fins ect.		N/A
M.1.2	A (250 ±5 mm) length of nichrome wire (80% nickel, 20% chromium , iron free) approximately 0,5 mm diameter and having a cold resistance of approximate. 5,28 Ω/m shall be used. The wire shall be connected in a straight length to a variable source of power which is adjusted to cause a power dissipation of 0,26 W/mm in the wire for a period of 8 to 12 s. After cooling, the wire shall wrapped around a sample to form five complete turns spaced 6 mm apart		N/A
M.1.3	The wrapped sample shall be supported in a horizontal position and the ends of the wire connected to the variable power source, which is again adjusted to dedicate 0,26 W/mm In the wire (see fig M.1)		N/A

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M.1.4	Start the test by energizing the circuit so that a current is passed through the heater wire yielding a linear power density of 0,26 W/mm		N/A
M.1.5	Continue heating until the test specimen ignites. When ignition occurs, shut of power and record time to ignite Discontinue the test if ignition does occur within 120 s. For specimens that melt through the wire without ignition, discontinue the test when the specimen is no longer in intimate contact with all five turns of the heater wire.	Ignited after: 1) _____s 2) _____s 3) _____s 4) _____s 5) _____s Melt trough all 5 turns: 1) _____s 2) _____s 3) _____s 4) _____s 5) _____s	N/A
M.1.6	The test shall be repeated on remaining samples	Ignited after: 1) _____s 2) _____s 3) _____s 4) _____s 5) _____s Melt trough all 5 turns: 1) _____s 2) _____s 3) _____s 4) _____s 5) _____s	N/A
	The follow information shall be recorded: Material: _____ Thickness: _____ Colour: _____ The average ignition time _____ mm _____ s (<input type="checkbox"/> ≤15 s <input type="checkbox"/> >15 s)		N/A
M.2	Arc ignition test		N/A
M.2.1	Three samples of each material shall be tested. The samples shall be 150 mm long by 13 mm wide and of uniform thickness stated by the material manufacturer. Edges shall be free from burrs, fins, act.		N/A
M.2.2	The tests shall be made with a pair of test electrodes and a variable inductive impedance load connected in series to a source of 230 Vac, 50 Hz or 60 Hz (see Figure M.2)		N/A

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M.2.3	One electrode shall be stationary and the other movable. The stationary electrode consist of a 8 mm ² to 10 mm ² solid copper conductor having a horizontal chisel point with a total angle of 30 °.The movable electrode shall be a 3 mm diameter stainless steel rod having a symmetrical conical point with a total angle of 60°, and shall be capable of being moved along its own axis. The radius of curvature for the electrode tips shall not exceed 0,1 mm at the start of a given test. The electrodes shall be located opposing each other, at an angle of 45° to the horizontal. With the electrodes short-circuited, the variable inductive impedance load shall be adjusted until the current is 33 A at a power factor of 0,5.		N/A
M.2.4	The sample under test shall be supported horizontally in air so that the electrodes, when toughing each other, are in contact with the surface of the sample. The movable electrode shall be manually or other wise controlled so that it can be withdrawn along its axis from contact with the stationary electrode to break the circuit, lowered to remake the circuit, so as to produce a series of arcs at a rate of approximately 40 arcs/min, with a separation speed of (250 ± 25 mm/s)		N/A
M.2.5	The test is to be continued until ignition of the sample occurs, a hole is burned through the sample, or a total of 200 cycles has elapsed.	Material: _____ Ignitions or hole burns 1) _____ 2) _____ 3) _____	N/A
		Material: _____ Ignitions or hole burns 1) _____ 2) _____ 3) _____	N/A
M.2.6	The average number of arcs to ignition and thickness of each set of specimen shall be recorded The hot wire ignition (HWI) and arc ignition (AI) test value requirements related to the material's flammability category are indicated in Table M.1	Material: _____ Thickness: _____ mm Average number of arcs: _____ Flammability category: _____	N/A
		Material: _____ Thickness: _____ mm Average number of arcs: _____ Flammability category: _____	N/A

9.1.5.2 TEST SEQUENCE Special tests – damp heat, salt mist, vibration and shock

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	For these special tests, Annex Q of IEC 60947-1 applies with the following additions.		
	Where Table Q.1 of IEC 60947-1 calls for verification of operational capability, this shall be done according to 9.3.6.2 of this standard.		N/A
	The vibration tests shall be done on the equipment in the open and closed positions..		N/A
	The overload relay shall not trip during the vibration test		N/A
	To check the behaviour of main and auxiliary contacts, vibration tests can be done under any current /voltage value.		N/A
	The shock test on the equipment shall be done in the open position.		N/A
	For the dry heat test, the equipment shall be in the close position during the conditioning period (see 5.3.3 of IEC 60068-2-2)		N/A
	For the dry heat test categories A, B and C, the test may be done without current in the poles and for categories D, E and F, the test shall be done under the maximum rated AC-3 current, but may be limited to 100 A for practical reasons. During the last hour, the contactor shall be operated 5 times. During the whole test the overload relay may trip.		N/A
	For the low temperature test, the test Ad is to be chosen instead of the test Ab and the equipment shall be in the open position during the cooling period. It shall then be energized for the last hour.		N/A
	For the low temperature test categories A, B and C, the test may be done without current in the poles and for categories D, E and F, the test is done under the maximum rated AC-3 current which may be limited to 100 A for practical reasons. During this last hour the contactor shall be operated 5 times. During the whole test the overload relay shall not trip.		N/A
	For the damp heat test, for categories A, B and C, the test may be done without current in the poles. For categories D, E and F the equipment shall be energized under the maximum rated AC-3 current for the first cycle and de-energized for the second cycle. The current may be limited to 100 A for practical reasons. After stabilization of the temperature, during the first 2 h of the first cycle and during the last 2 h of the second cycle, the contactor shall be operated 5 times. The overload relay may trip only if it is permitted according to its temperature characteristic.		N/A

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	Flame tests according IEC 60695-11-10		
	Test method A		
a)			
b)			
c)			
d)			
e)			
f)			
g)			
h)			
i)			
j)			
k)			
l)			
m)			
n)	<input type="checkbox"/> HB <input type="checkbox"/> HB40 <input type="checkbox"/> HB 75		
	Flame tests according IEC 60695-11-10		
	Test method B		
a)			
b)			
c)			
d)			
e)			
f)			
g)			

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h)		
i)		
j)		
k)		
l)		
m)		
n)	<input type="checkbox"/> V-0 <input type="checkbox"/> V-1 <input type="checkbox"/> V-2	

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	TABLE 1 : temperature rise measurements	GMC-6M		P
temperature rise dT of part:		phase	dT (K)	required dT (K)
1: Main Terminal		R	16.8	65
2: Main Terminal		S	18.0	65
3: Main Terminal		T	17.2	65
4: Main Terminal		U	22.8	65
5: Main Terminal		V	33.5	65
6: Main Terminal		W	23.7	65
7: Auxiliary terminal		13 NO	13.9	65
8: Auxiliary terminal		14 NO	14.2	65
9: Surface of main circuit		Side wall	11.7	40
10: Surface of main circuit		Cover	8.4	40
12: Ambient temp.		+20.8		10 - 40

	TABLE: Heating test, resistance method				GMC-6M		P
	Test voltage (V)			60Hz, 550V		—	
	Ambient, t ₁ (°C)			20.8		—	
	Ambient, t ₂ (°C)			20.8		—	
Temperature rise of winding		R ₁ (Ω)	R ₂ (Ω)	dT (K)	Max. dT (K)	Insulation class	
43.4		8.8 kΩ	9.58 kΩ	22.6	100	E	
supplementary information: T2 = R2/R1 (T1 + 234.5) – 234.5 = 43.4							

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GMD-6M with DC Coil at 240 V

TABLE 2 : temperature rise measurements			
GMD-6M			
temperature rise dT of part:	phase	dT (K)	required dT (K)
1: Main Terminal	R	14.0	65
2: Main Terminal	S	15.5	65
3: Main Terminal	T	13.0	65
4: Main Terminal	U	21.6	65
5: Main Terminal	V	25.7	65
6: Main Terminal	W	22.1	65
7: Auxiliary terminal	13NO	7.6	65
8: Auxiliary terminal	14NO	11.8	65
9: Surface of main circuit	Side wall	8.9	40
10: Surface of main circuit	Cover	6.9	40
12: Ambient temp.	+21.4		10 - 40

TABLE: Heating test, resistance method					
GMD-6M					
Test voltage (V)			DC 240V		—
Ambient, t_1 (°C)			21.3		—
Ambient, t_2 (°C)			21.4		—
Temperature rise of winding	R_1 (Ω)	R_2 (Ω)	dT (K)	Max. dT (K)	Insulation class
67.5	16.87 kΩ	19.92 kΩ	46.1	100	E
supplementary information: $T_2 = R_2/R_1 (T_1 + 234.5) - 234.5 = 67.5$					

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GMD-6MC with DC coil at 240 V

TABLE 3 : temperature rise measurements		GMD-6MC	
temperature rise dT of part:	phase	dT (K)	required dT (K)
1: Main Terminal	R	24.5	65
2: Main Terminal	S	33.5	65
3: Main Terminal	T	33.4	65
4: Main Terminal	U	28.1	65
5: Main Terminal	V	28.2	65
6: Main Terminal	W	26.1	65
7: Auxiliary terminal	13NO	13.7	65
8: Auxiliary terminal	14NO	12.0	65
9: Surface of main circuit	Side wall	11.3	40
10: Surface of main circuit	Cover	7.7	40
12: Ambient temp.	+21.5		10 - 40

TABLE: Heating test, resistance method				GMD-6MC	
Test voltage (V)		DC 240V		—	
Ambient, t_1 (°C)		21.9		—	
Ambient, t_2 (°C)		21.5		—	
Temperature rise of winding	R_1 (Ω)	R_2 (Ω)	dT (K)	Max. dT (K)	Insulation class
68.9	17.24 kΩ	20.40 kΩ	47.4	100	E
supplementary information: $T_2 = R_2/R_1 (T_1 + 234.5) - 234.5 = 68.9$					

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GMD-6MF with DC coil at 240 V

TABLE 4 : temperature rise measurements		GMD-6MF	
temperature rise dT of part:	phase	dT (K)	required dT (K)
1: Main Terminal	R	15.1	65
2: Main Terminal	S	16.1	65
3: Main Terminal	T	14.2	65
4: Main Terminal	U	19.2	65
5: Main Terminal	V	18.7	65
6: Main Terminal	W	17.1	65
7: Auxiliary terminal	13NO	7.4	65
8: Auxiliary terminal	14NO	8.1	65
9: Surface of main circuit	Side wall	10.6	40
10: Surface of main circuit	Cover	9.2	40
12: Ambient temp.	+21.5		10 - 40

TABLE: Heating test, resistance method				GMD-6MF	
Test voltage (V)		DC 240V		—	
Ambient, t ₁ (°C)		21.7		—	
Ambient, t ₂ (°C)		21.5		—	
Temperature rise of winding	R ₁ (Ω)	R ₂ (Ω)	dT (K)	Max. dT (K)	Insulation class
69.6	16.59 kΩ	19.69 kΩ	48.1	100	E
supplementary information: T ₂ = R ₂ /R ₁ (T ₁ + 234.5) – 234.5 = 69.6					

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GMD-6MP with DC coil at 240 V

TABLE 5 : temperature rise measurements		GMD-6MP	
temperature rise dT of part:	phase	dT (K)	required dT (K)
1: Main Terminal	R	10.2	65
2: Main Terminal	S	11.7	65
3: Main Terminal	T	11.6	65
4: Main Terminal	U	13.2	65
5: Main Terminal	V	14.6	65
6: Main Terminal	W	12.8	65
7: Auxiliary terminal	13NO	8.0	65
8: Auxiliary terminal	14NO	8.8	65
9: Surface of main circuit	Side wall	14.8	40
10: Surface of main circuit	Cover	6.6	40
12: Ambient temp.	+21.0		10 - 40

TABLE: Heating test, resistance method				GMD-6MP	
Test voltage (V).....:		DC 240V		—	
Ambient, t ₁ (°C)		20.9		—	
Ambient, t ₂ (°C)		21.0		—	
Temperature rise of winding	R ₁ (Ω)	R ₂ (Ω)	dT (K)	Max. dT (K)	Insulation class
67.5	17.44 kΩ	20.62 kΩ	46.5	100	E
supplementary information: $T_2 = R_2/R_1 (T_1 + 234.5) - 234.5 = 67.5$					

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TABLE: Dielectric Strength		P
Test voltage applied between:	Test potential applied (V)	Breakdown / flashover (Yes/No)
Between Main Terminals (R<->S, S<->T, T<->R)	2 380	No
Between Main Terminals and Auxiliary Terminals	2 380	No
Between Main Terminals and Coil Terminals	2 380	No
Between Auxiliary Terminals and Coil Terminals	2 380	No
Between All terminals and the enclosure or mounting plate	2 380	No
supplementary information:		

		TABLE: Electrical Data (in normal conditions)					N/A
fuse #	I rated (A)	U (V)	P (W)	I (mA)	I fuse (mA)	condition/status	
supplementary information:							

	TABLE: Power Input Deviation					N/A
Input deviation of/at:	P rated (W)	P measured (W)	dP	Required dP	Remark	
supplementary information:						

TABLE: insulation resistance measurements			N/A
Insulation resistance R between:	R (MΩ)	Required R (MΩ)	
Between mains poles (primary fuse disconnected)			
Between parts separated by basic or supplementary insulation			
Between parts separated by double or reinforced insulation			
supplementary information:			

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	TABLE: Impact Resistance			N/A
Impacts per surface	Surface tested	Impact energy (Nm)	Comments	
supplementary information:				

TABLE: Clearance And Creepage Distance Measurements						P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Between Main Terminals		690	5.5	*1	9.0	9.5
Between Main Terminals and Coil Terminals		690	5.5	*1	9.0	9.5
Between Main Terminals and Auxiliary Terminals		690	5.5	*1	9.0	9.5
supplementary information:						
*1. Impulse Test was done instead of measuring the clearance.						

TABLE: Distance Through Insulation Measurements				N/A
Distance through insulation di at/of:	U r.m.s. (V)	Test voltage (V)	Required di (mm)	di (mm)
supplementary information:				

	TABLE: Ball Pressure Test of Thermoplastics		N/A
Allowed impression diameter (mm) :			—
Part	Test temperature (°C)	Impression diameter (mm)	
supplementary information:			

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TABLE: Threaded Part Torque Test				N/A
Threaded part identification	Diameter of thread (mm)	Column number (I, II, or III)	Applied torque (Nm)	
supplementary information:				

TABLE: Over-voltage and Under-voltage Test					P
Test	Operating condition	Rated voltage (V)	Test voltage (V)	Temperature (°C)	Comments
Over-voltage	Heated condition	AC 550V	AC 605V	40	Operated successfully
Under-voltage	Heated condition	AC 550V	AC 467.5	40	Operated successfully
supplementary information:					

TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾
Top Cover	BASF Corp Polymers Div	8231GHS FR	V-0, 105°C	E36632	UL 746C
	BASF Corp Polymers Div	8233GHS	HB, 105 °C	E36632	UL 746C
	Rhodia Polyamide Co Ltd	1021GF	HB, 105 °C	E78648	UL 746C
	LG CHEMICAL LTD	LUPON GP-2251A-F	V-0, 105°C	E67171	UL 746C
	Korea Engineering Plastics Co Ltd	1325GVS	V-2, 105°C	E120354	UL 746C
	BASF Corp Polymers Div	8232G HSFR	V-0, 105°C	E36632	UL 746C
Upper Frame	Rhodia Polyamide Co Ltd	2413GW	V-0, 120°C	E78648	UL 746C
	BASF Corp Polymers Div	5232GHSFR	V-0, 105°C	E36632	UL 746C
	LG CHEMICAL LTD	GP2251BFH	V-0, 120°C	E67171	UL 746C
	Korea Engineering Plastics Co Ltd	2325GVS	V-0, 130°C	E120354	UL 746C
	Lanxess AG	DP2851/30H+	V-0, 125°C	E245249	UL 746C
Lower Frame	BASF Corp Polymers Div	8233GHS	HB, 105 °C	E36632	UL 746C

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	Rhodia Polyamide Co Ltd	1021GSW	V-0, 105°C	E78648	UL 746C
	BASF Corp Polymers Div	8232G HSFR	V-0, 105°C	E36632	UL 746C
	LG CHEMICAL LTD	GP-2259AFL	V-2, 90°C	E67171	UL 746C
	Korea Engineering Plastics Co Ltd	2325GVS	V-0, 130°C	E120354	UL 746C
	Rhodia Engineering Plastics	C 52G3 MZ25	V-2, 105°C	E44716	UL 746C
Bobbin	Rhodia Polyamide Co Ltd	2413GW	V-2, 120°C	E78648	UL 746C
	LG CHEMICAL LTD	GP2251BFH	V-0, 120°C	E67171	UL 746C
	Korea Engineering Plastics Co Ltd	2325GVS	V-0, 130°C	E120354	UL 746C
	Rhodia Engineering Plastics	C52G3MZ25	V-2, 65°C	E44716	UL 746C
	LG CHEMICAL LTD	GP-2259AFL	V-2, 90°C	E67171	UL 746C
	Lanxess AG	DP2851/30H+	V-0, 125°C	E245249	UL 746C
Moving contact terminal	-	Phosphor Bronze 0.6 t	-		-
Fixed contact terminal	-	Copper Alloy 1.0 t	-	-	-
supplementary information:					
¹⁾ Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

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Glow Wire Test						P
No.	Component	Glow Wire Temperature °C	Part - Touching Live part	Time to Ignite / Total Flaming and Glowing Time After Glow Wire Tip Removal	Comments (Ignition of tissue paper)	Results
1	Lanxess AG (PA66, DP 2851/30H+)	850 °C	Yes	Ignition less than 1 sec	Specimen did not drip (No ignition to tissue paper)	Pass
2	Rhodia Polyamide Co Ltd (2413GW)	850 °C	Yes	Ignition less than 1 sec	Specimen did not drip (No ignition to tissue paper)	Pass
3	LG Chemical (PA6, LUMID GP-2259AFL)	850 °C	No	Ignition less than 1 sec	Specimen did not ignite (No ignition to tissue paper)	Pass
4	BASF Corp Polymers Div (8232G HSFR)	850 °C	Yes	Ignition less than 1 sec	Specimen did not drip (No ignition to tissue paper)	Pass
5	Korea Engineering Plastics Co Ltd (2325GVS)	850 °C	Yes	Ignition less than 1 sec	Specimen did not drip (No ignition to tissue paper)	Pass
6	BASF Corp Polymers Div (8231GHS FR)	650 °C	Yes	No ignition	Specimen did not drip (No ignition to tissue paper)	Pass
7	BASF Corp Polymers Div (8233GHS)	650 °C	Yes	No ignition	Specimen did not drip (No ignition to tissue paper)	Pass
8	Rhodia Polyamide Co Ltd (1021GF)	650 °C	Yes	No ignition	Specimen did not drip (No ignition to tissue paper)	Pass
9	LG CHEMICAL LTD (LUPON GP-2251A-F)	650 °C	Yes	No ignition	Specimen did not drip (No ignition to tissue paper)	Pass
10	Korea Engineering Plastics Co Ltd (LUPON GP-2251A-F)	650 °C	Yes	No ignition	Specimen did not drip (No ignition to tissue paper)	Pass
11	BASF Corp Polymers Div (5232GHSFR)	850 °C	Yes	Ignition less than 1 sec	Specimen did not drip (No ignition to tissue paper)	Pass

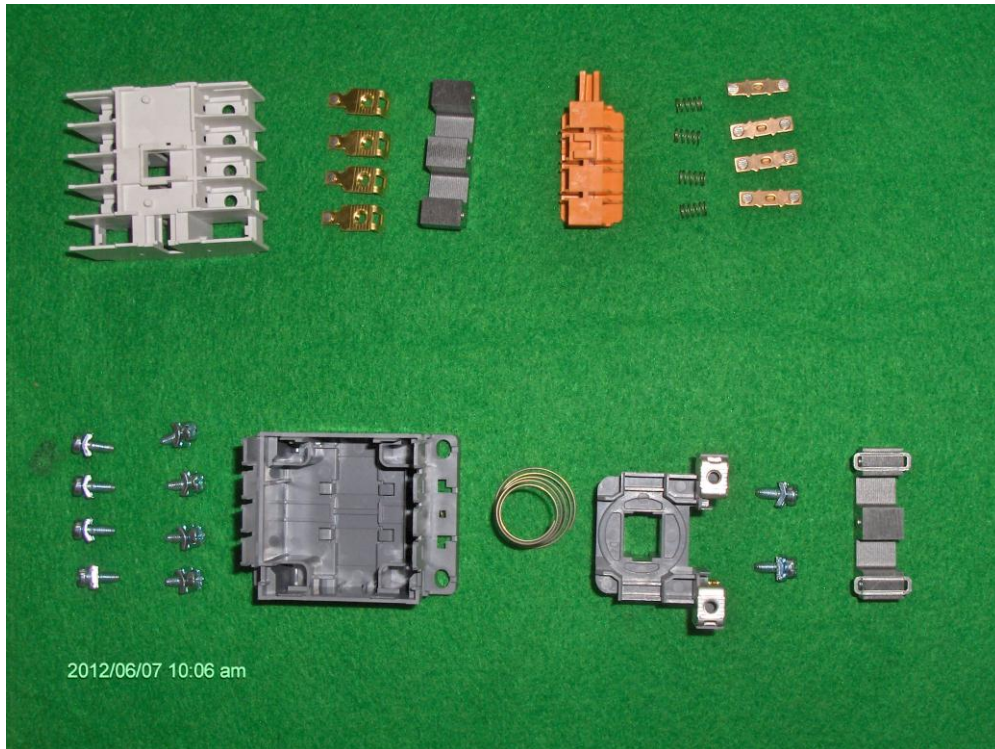
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12	LG CHEMICAL LTD (GP2251BFH)	850 °C	Yes	Ignition less than 1 sec	Specimen did not drip (No ignition to tissue paper)	Pass
13	Rhodia Polyamide Co Ltd (1021GSW)	850 °C	Yes	Ignition less than 1 sec	Specimen did not drip (No ignition to tissue paper)	Pass
14	Rhodia Engineering Plastics (C52G3 MZ25)	850 °C	Yes	Ignition less than 1 sec	Specimen did not drip (No ignition to tissue paper)	Pass

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	TEST EQUIPMENT INFORMATION			P
Inst. ID No.	Instrument Type, Manufacturer, Model, Serial No.	Function/Range	Last Cal. Date	Next Cal. Date
18-744	STOP WATCH	1/100 s	2010-06-02	2012-06-02
70-219	Hybrid Recorder	0~200 °C, 20 Ch, 60 mm/hr	2011-11-10	2012-11-10
82-447	OVER CURRENT Tester	MAX. 1000 A	2011-08-11	2012-08-11
04-352	Dial Caliper	0~150 mm	2011-11-12	2012-05-12
13-1124	Torque Meter	4.9 Nm	2012-03-13	2012-08-13
70-105	TEMPERATURE CHAMBER	-30 °C ~ 120 °C	2011-08-12	2012-08-12
70-35	Hygrometer	60 °C, 100 %	2011-04-23 2012-04-08	2012-04-23 2013-04-08
31-68	DIELECTRIC VOLTAGE TEST	AC/DC 5 kV	2011-06-13	2012-06-13
25-87	DIGITAL POWER METER	MAX. 600 V, 600 A	2011-06-13	2012-06-13
68-0184 ~ 0186	POTENTIAL TRANSFORMER	600 V/ 5 V	2011-05-26	2013-05-26
33-0131 ~ 0133	CURRENT SHUNT	5000 A / 50 mV	2011-05-12 2012-05-04	2012-05-12 2013-05-04
20-553	DIGITAL MULTIMETER	MAX. 1000 V, 10 A	2011-10-12	2012-10-12
55-013	OSCILLOGRAPH RECORDER	50 V/ 50 mV	2012-01-06	2013-01-06
82-429	OVER CURRENT Tester	MAX. 100 A	2011-08-11	2012-08-11

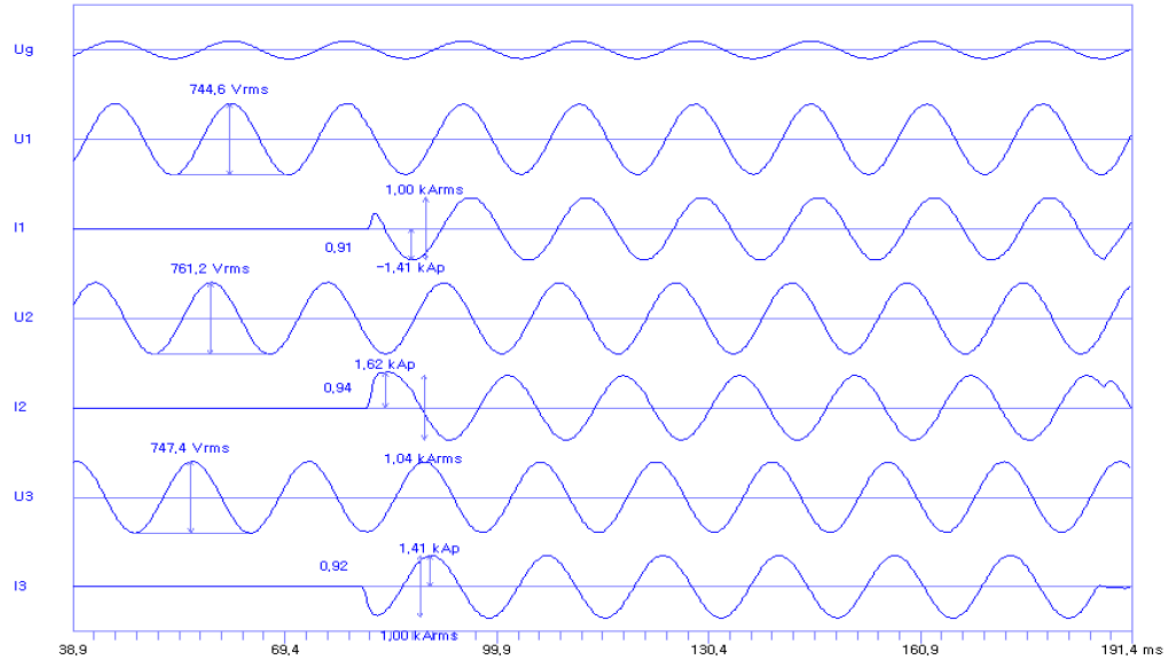
Annexure 1**Photographs (Pictures of the products) : GMC-6M, GMC-6MC, GMC-6MF, GMC-6MP****GMC-6M Front view****GMC-6M Rear view****GMC-6MC Front view****GMC-6MC Rear view****GMC-6MF Front view****GMC-6MF Rear view****GMC-6MP Front view****GMC-6MP Rear view**

Annexure 2**Photographs (Pictures of the products assembled) : GMC-6M**

IEC 60947-4-1

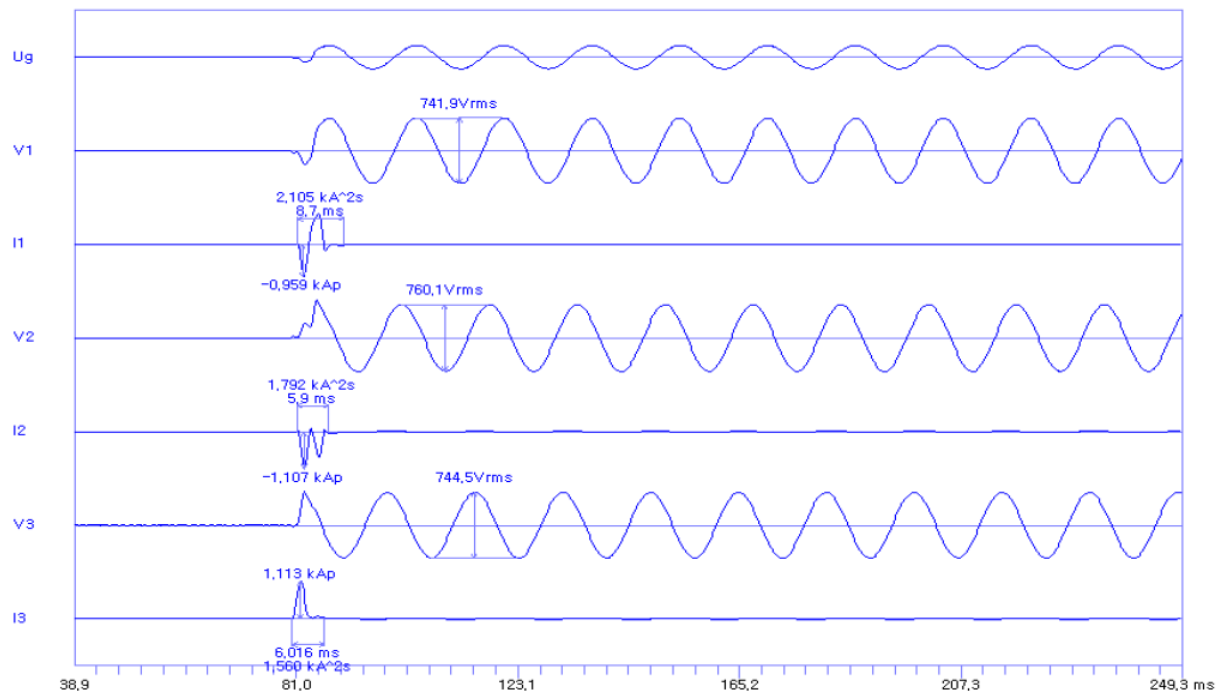
Annexure 3

Conditional short circuit withstand oscillograms: Calibration of 1 kA, 690 Vac



Date : 2012:4:12, Time : 15:37:35
 Rec. No. : R412-751.1V 1.01kA PF0.92

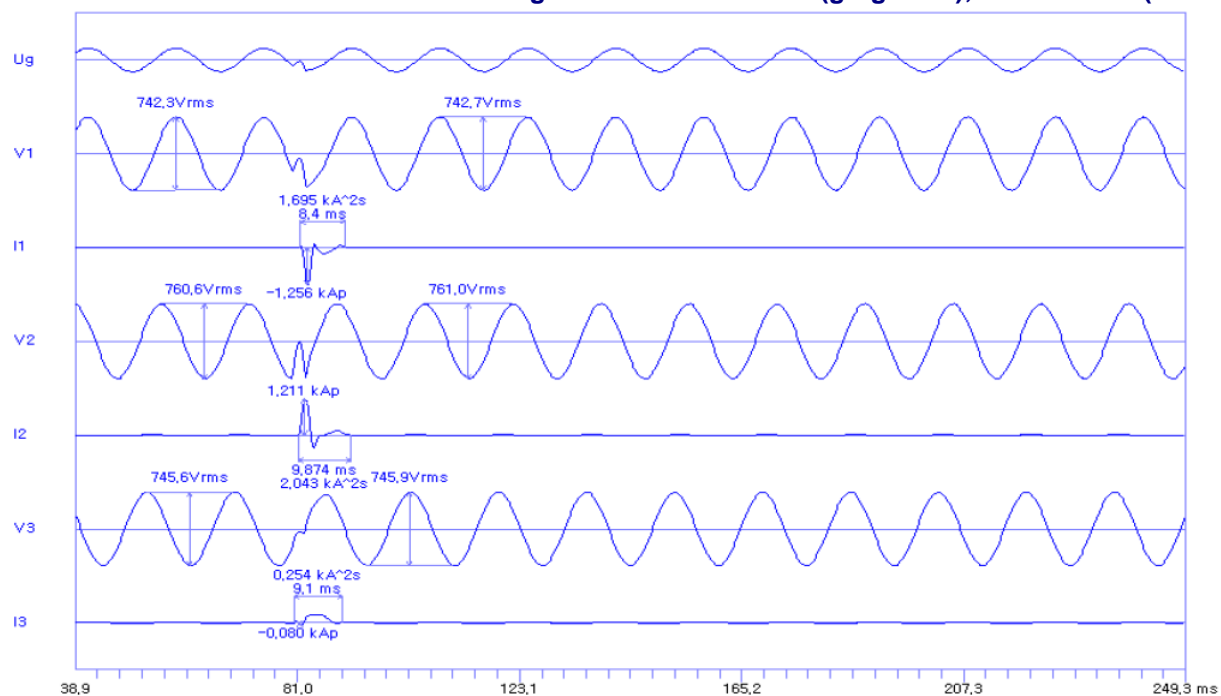
Conditional short circuit withstand oscillograms: GMC-6M+Fuse (gL-gG20A), 690 V 1.0 kA (First)



Date : 2012:4:12, Time : 15:50:13
 Rec. No. : R412-0085-1-O
 GMC-6M+FUSE(gL-gG 20A)

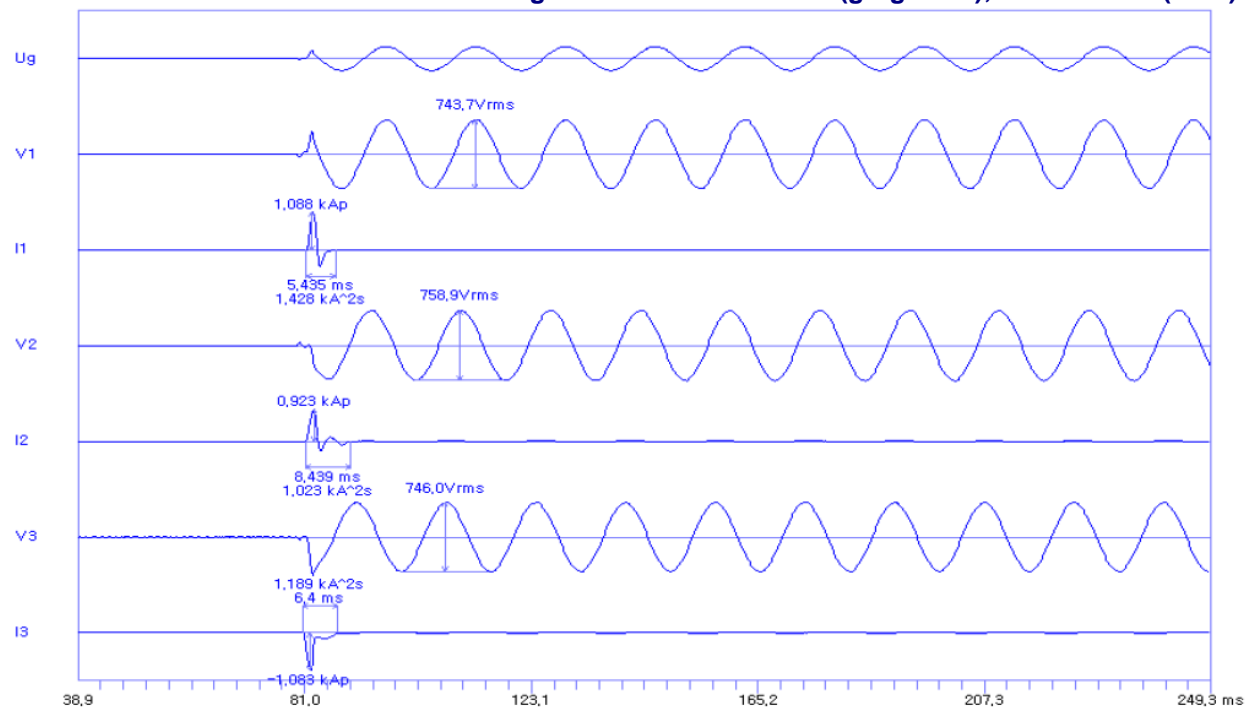
IEC 60947-4-1

Conditional short circuit withstand oscillograms: GMC-6M+Fuse (gL-gG20A), 690 V 1.0 kA (Second)



Date : 2012:4:12, Time : 15:59:25
 Rec. No. : R412-0085-1-CO
 GMC-6M+FUSE(gL-gG 20A)

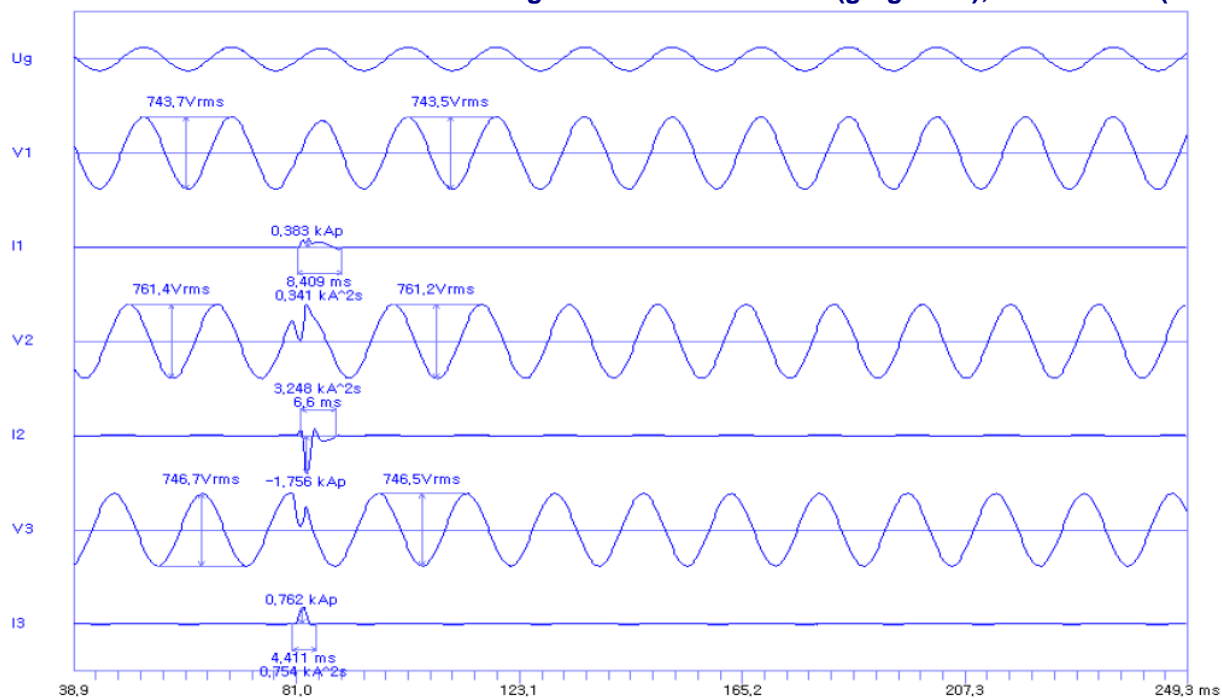
Conditional short circuit withstand oscillograms: GMD-6MC+Fuse (gL-gG20A), 690 V 1.0 kA (First)



Date : 2012:4:12, Time : 16:22:47
 Rec. No. : R412-0085-2-O
 GMD-6MC+FUSE(gL-gG 20A)

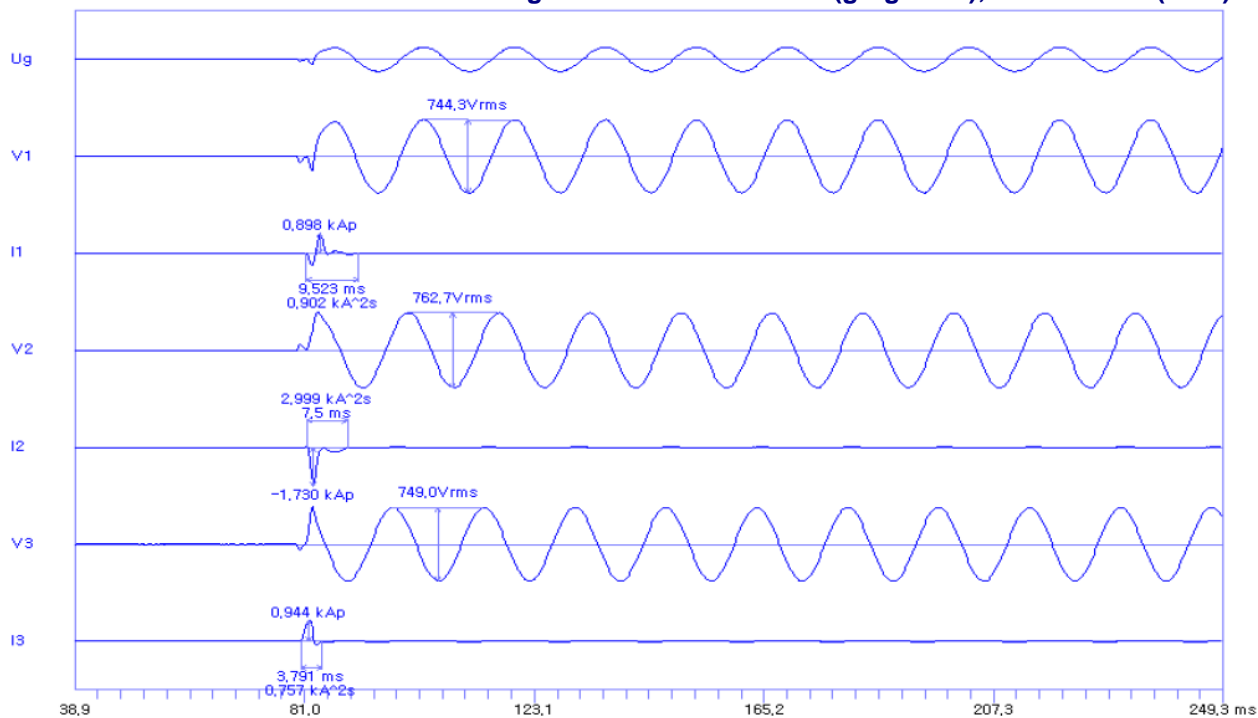
IEC 60947-4-1

Conditional short circuit withstand oscillograms: GMD-6MC+Fuse (gL-gG20A), 690 V 1.0 kA (Second)



Date : 2012:4:12, Time : 16:25:40
 Rec. No. : R412-0085-2-CO
 GMD-6MC+FUSE(gL-gG 20A)

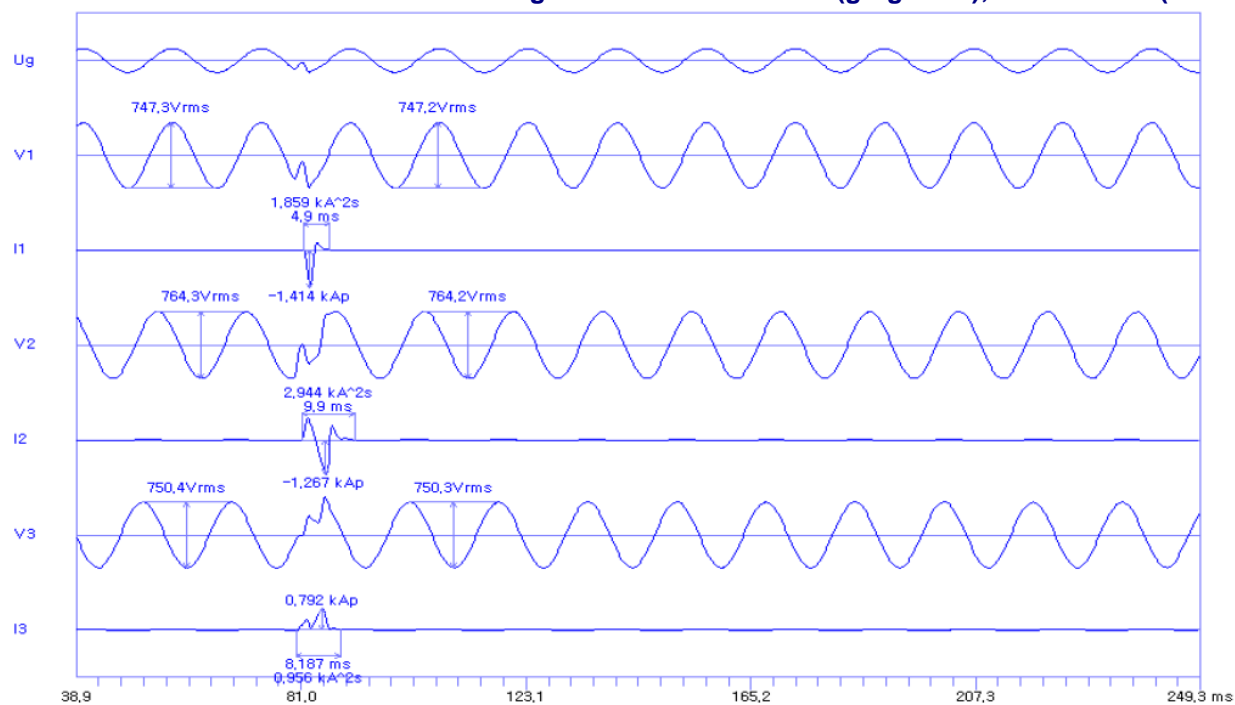
Conditional short circuit withstand oscillograms: GMC-6MF+Fuse (gL-gG20A), 690 V 1.0 kA (First)



Date : 2012:4:12, Time : 16:8:21
 Rec. No. : R412-0085-3-O
 GMC-6MF+FUSE(gL-gG 20A)

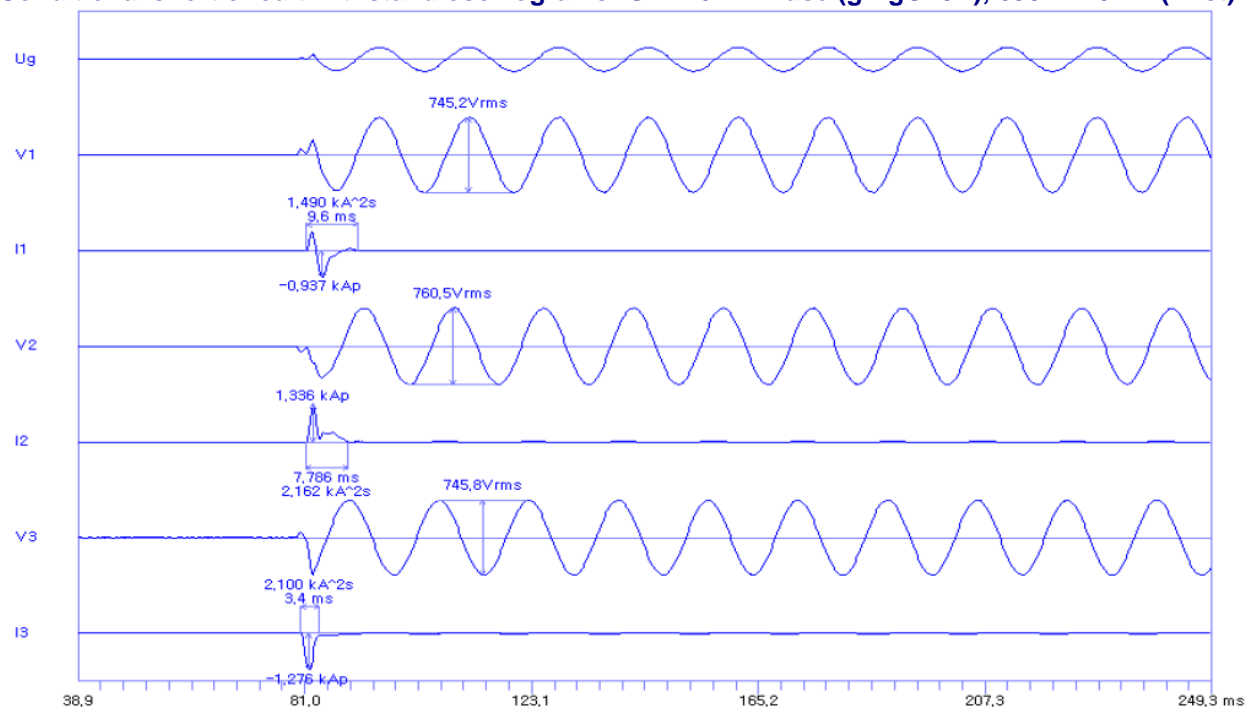
IEC 60947-4-1

Conditional short circuit withstand oscillograms: GMC-6MF+Fuse (gL-gG20A), 690 V 1.0 kA (Second)



Date : 2012:4:12, Time : 16:10:51
 Rec. No. : R412-0085-3-CO
 GMC-6MF+FUSE(gL-gG 20A)

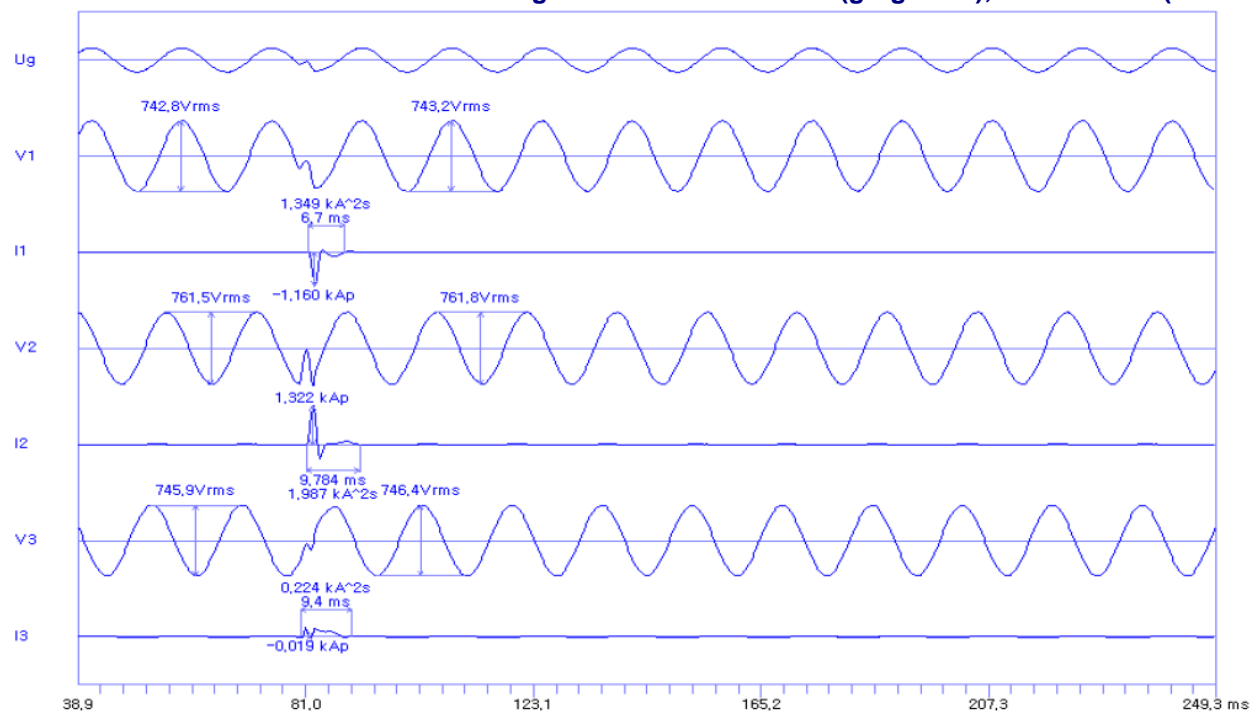
Conditional short circuit withstand oscillograms: GMD-6MP+Fuse (gL-gG20A), 690 V 1.0 kA (First)



Date : 2012:4:12, Time : 16:34:24
 Rec. No. : R412-0085-4-O
 GMD-6MP+FUSE(gL-gG 20A)

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Conditional short circuit withstand oscillograms: GMD-6MP+Fuse (gL-gG20A), 690 V 1.0 kA (Second)



Date : 2012-4-12, Time : 16:36:11
 Rec. No. : R412-0085-4-CO
 GMD-6MP+FUSE(gL-gG 20A)

IEC 60947-4-1**Annexure 4****Clause 8.3.4 : Performance under conditional short-circuit current**

Enclosure and fusible element wire details :

Enclosure : Metallic enclosure, dimension (WXHXD) = 90 mm X 160 mm X 130 mm

Fusible element : 0.8 mm dia, Copper.



Annexure 5

Installation Instructions or manufacturer published literature

Instruction manual I-1

INSTRUCTION MANUAL

META
MEC Series

GMC(D)-6M~16M

GTH(K)-12M

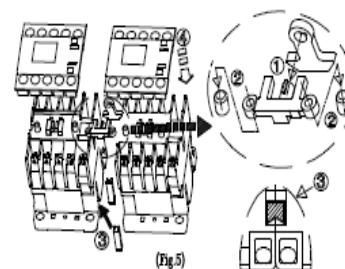
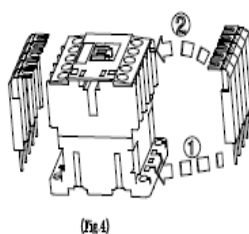
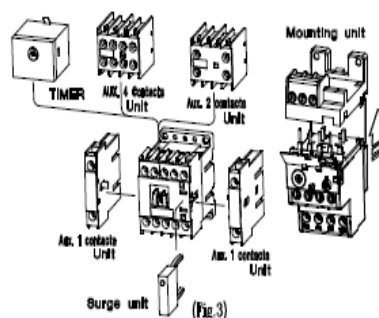
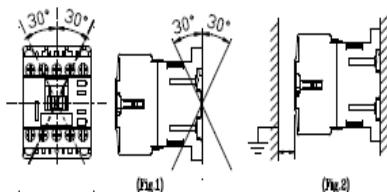
You have made a good choice in selecting a LG Industrial Systems Co., Ltd. products. To get the best performance from your purchase, be sure to read this manual carefully before use. This manual should be given to the person who actually uses the products and is responsible for their maintenance.

⚠ WARNING

1. Turn off the before starting maintenance or inspection. Failure to turn off power may result in electrical shock or burning.
2. Please, make sure that the terminal are firmly connected. Loose connection may cause fire.
3. Do not convert products unless it is permitted.
4. Do not use the product with its top cover removed, it may cause electrical shock or burn.
5. When power becomes off due to the trip of Thermal overload relay, reset it after removing the cause.
6. Only expert can do installation or maintenance.
7. Treat the product as industrial waste when discarding.

■ Handling instruction

1. Install onto the place where it is free from vibration and humidity.
2. Even the installing direction takes the direction of Fig.1 to the perpendicular plane, the direction up to the direction of 30°.
3. Keep the distance more than 10mm with Mini-Contactor arc space shown in Fig.2 when installing magnetic contactors in panel.
4. Attach accessories as though in Fig.3
5. Assemble pin case unit as though in Fig.4
6. Assemble mechanical interlock as though in Fig.5



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Instruction manual I-2

■ Coil

The No. of Aux. contact is different according to the power consumption.

Frame Size	Type	Consumption Power (Inrush)	Aux. Contacts
GMC-6M~16M	AC	32VA	6
GMD-6M~16M	DC	3W	6
		2W	2
		1.2W	-

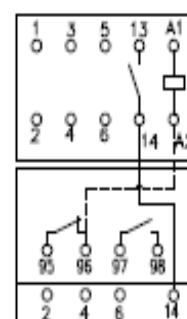
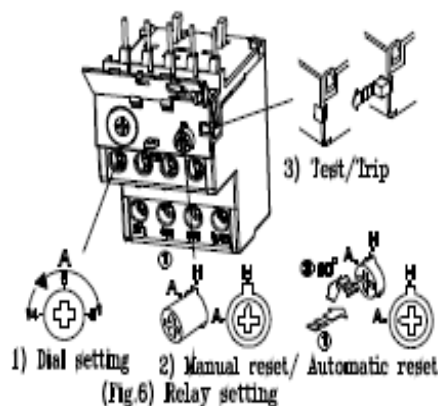
Frame Size	Type	Consumption Power (Sealed)	Aux. Contacts
GMC-6M~16M	AC	6VA	6
GMD-6M~16M	DC	3W	6
		2W	2
		1.2W	-

■ Thermal overload relay

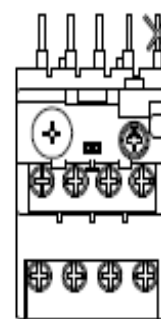
1. In order to set dial ampere, open the safety cover. (See Fig.6)
2. Turn the current setting dial arrow to the appropriate amperage setting(See Fig.6.1) For service factors other than 1.00, increase the current setting by the service factor percentage. Relays may be set up to 30% greater than the maximum motor amperage.
3. Select either manual overload reset(H) or automatic reset(A) by depressing and rotating the selection button so that the arrow points to the desired mode.(See Fig.6.2)
4. To test trip the overload relay, lift the red trip indicator.(manual reset mode only)(See Fig.6.3)
5. Remove the causes of overload and reset a tripped relay by depressing the reset button. Relay will only reset after sufficient cooling time has elapsed.

⚠ CAUTIONS

1. When dial is not handled properly, there may be a fault and an accident may occur.(See Fig.6.1)
2. The pre-wiring of inside TOR is shown in Fig.7. If pre-wiring is not required, break off the link located on the thermal overload relay.(See Fig.8)
3. In case of using in electronic device to receive the trip signal from 95 and 96, the breakdown may occur in the electronic device.



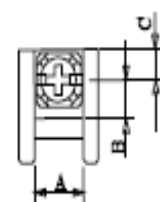
(Fig.7) Connecting diagram



(Fig.8) Caution

■ Size of wire connecting torque

Screw	Wire (mm ²)	Torque (kgf·cm)	AxBxC (mm)
M3.5	1.25~2	8	7.6x4x4.5



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Instruction manual II-1

배선시 결선도에 따라 주의하여 작업하며
반드시 Top Cover를 조립하여 사용하십시오

Caution **주 의**

(Fig.1)

(Fig.2)

Mounting
M4 35~37x50

주 의

1. 제품을 설치 하기 전 본 사용 설명서를 반드시 읽고 설명에 따라 설치 하여 주십시오.
잘못된 설치로 인한 오동작 및 사고가 발생합니다.
2. 전선 접속시 제품에 적합한 전선을 사용하고 규정된 체결 도오크로 전선을 접속하되 규정된 체결 도오크를 유지하여 주십시오.
과열 및 화재의 위험이 있습니다.
3. 제품 설치 및 보수시 전문 자격자에 의해 설치 하여 주십시오.
잘못된 설치로 인한 오동작 및 사고가 발생합니다.
4. Top Cover를 제거 후 사용 하지 마세요
다치거나 감전의 원인이 됩니다.
5. 제품 폐기시 산업 폐기물로 처리하여 주십시오.
6. Fig.1과 같이 수직면에 30° 이내로 부착하여 주십시오.
Fig.2와 같이 아크소호 공간을 10mm 이상 유지하여 주십시오.

Pre-wiring
결선도

(Fig.1)

Note)
If pre-wiring is not required, break off the link located on the thermal overload relay.
주의)
연결 전선이 필요하지 않으면 열동형 과부하 계전기의 연결 전선을 자르고 사용하세요.

Type	Screw	Wire (mm ²)	Torque (kgf.cm)	AxBxC (mm)
Main				
Aux	M3.5	1.25~2	12	7.0X4X4.5
Coil				

(Fig.2)

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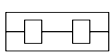
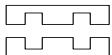
Instruction manual II-2

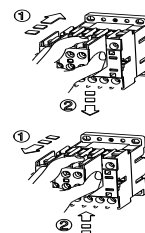
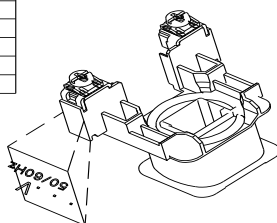
⚠ Caution

1. Install the product assuring a space of at least that which is specified in the instruction manual. Failure to do so may result in fire and scorching.
2. For wiring, select wire sizes suitable for the applied voltage and current. Tighten wires with the tightening torque specified in the instruction manual, and, maintain tighten torque. Failure to do so may result in fire.
3. Installation, maintenance and inspection of the product should be performed by qualified engineers special knowledge. Failure to do so may result in fire and scorching.
4. Do not use the product after removing its top-cover. Electric shock or burning may result.
5. Treat the product as industrial waste when discarding.
6. Even the installing direction takes the direction of Fig.1 to the perpendicular plane, up to the direction of 30°. Keep the distance more than 10mm with arc space shown in Fig.2

AC		DC		
50Hz	60Hz	3W	2W	1.2W
24V		12V	12V	12V
36V		20V	20V	20V
42V		24V	24V	24V
48V		36V	48V	48V
110V		42V	72V	72V
115V		48V	110V	110V
120V		60V	120V	120V
127V		72V		
200V	208V	110V		
220V	230V	120V		
230V	240V	125V		
256V		220V		
277V		240V		
380V	400V	250V		
400V				
440V				
480V				
500V				
550V				

■기타 코일은 문의바랍니다.
 ■Other voltages on request

	AC (VA)	DC (W)
	6	1.2 2 3
	32	1.2 2 3

**⚠ 주의**
Caution

Type	Aux. Contacts
AC Coil	6
DC Coil	6
2W	2
1.2W	0

주의
 소비전력(과) 이하
 보조 접점수가 제한됩니다.

Note)
 In DC coils, the
 consumptions limits
 attached Aux. contacts.

IEC 60947-4-1

Annexure 6

Product / Component Drawings

1) Screw Terminals Type Contactors

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TYPE	EXTERNAL	MOUNTING
GMC-6M GMC-9M GMC-12M GMC-16M GMC-6M/4 GMC-9M/4 GMC-12M/4 GMC-16M/4		<p>Weight : 0.17kg</p>
GMD-6M GMD-9M GMD-12M GMD-16M GMD-6M/4 GMD-9M/4 GMD-12M/4 GMD-16M/4		<p>Weight : 0.26kg</p>
GMC-6M GMC-9M GMC-12M GMC-16M GMD-6M GMD-9M GMD-12M GMD-16M	3-Pole contactors <div style="display: flex; justify-content: space-around; align-items: center;"> </div>	
GMC-6M/4 GMC-9M/4 GMC-12M/4 GMC-16M/4 GMD-6M/4 GMD-9M/4 GMD-12M/4 GMD-16M/4	4-Pole contactors <div style="display: flex; justify-content: space-around; align-items: center;"> </div>	

2) Cage Terminal Type Contactors

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TYPE	EXTERNAL	MOUNTING
GMC-6MC GMC-9MC GMC-12MC GMC-16MC GMC-6MC/4 GMC-9MC/4 GMC-12MC/4 GMC-16MC/4		
GMD-6MC GMD-9MC GMD-12MC GMD-16MC GMD-6MC/4 GMD-9MC/4 GMD-12MC/4 GMD-16MC/4		
GMC-6MC GMC-9MC GMC-12MC GMC-16MC GMD-6MC GMD-9MC GMD-12MC GMD-16MC	3-Pole contactors <div style="display: flex; justify-content: space-around; align-items: center;"> </div>	
GMC-6MC/4 GMC-9MC/4 GMC-12MC/4 GMC-16MC/4 GMD-6MC/4 GMD-9MC/4 GMD-12MC/4 GMD-16MC/4	4-Pole contactors <div style="display: flex; justify-content: space-around; align-items: center;"> </div>	

3) Fasten Terminal Type Contactors

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TYPE	EXTERNAL	MOUNTING
GMC-6MF GMC-9MF GMC-12MF GMC-16MF GMC-6MF/4 GMC-9MF/4 GMC-12MF/4 GMC-16MF/4		<p>Weight : 0.18kg</p>
GMD-6MF GMD-9MF GMD-12MF GMD-16MF GMD-6MF/4 GMD-9MF/4 GMD-12MF/4 GMD-16MF/4		<p>Weight : 0.27kg</p>
GMC-6MF GMC-9MF GMC-12MF GMC-16MF GMD-6MF GMD-9MF GMD-12MF GMD-16MF	3-Pole contactors	
GMC-6MF/4 GMC-9MF/4 GMC-12MF/4 GMC-16MF/4 GMD-6MF/4 GMD-9MF/4 GMD-12MF/4 GMD-16MF/4	4-Pole contactors	

4) Solder Terminal Type Contactors

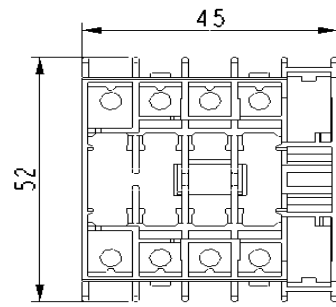
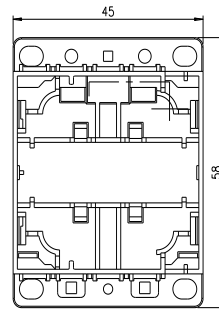
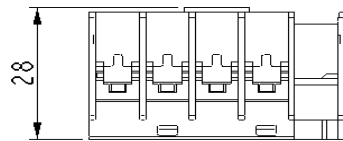
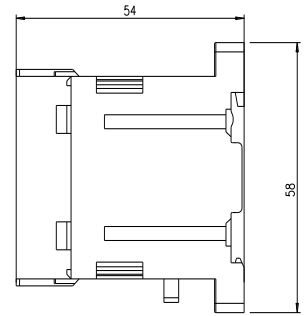
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IEC 60947-4-1

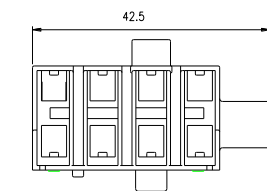
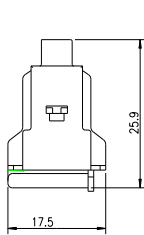
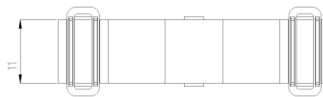
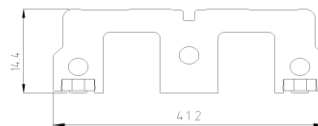
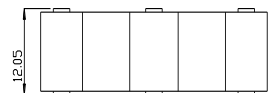
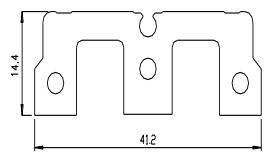
TYPE	EXTERNAL	MOUNTING
GMC-6MP GMC-9MP GMC-12MP GMC-16MP GMC-6MP/4 GMC-9MP/4 GMC-12MP/4 GMC-16MP/4		<p>On printed circuit board</p> <p>Weight : 0.17kg</p>
GMD-6MP GMD-9MP GMD-12MP GMD-16MP GMD-6MP/4 GMD-9MP/4 GMD-12MP/4 GMD-16MP/4		<p>On printed circuit board</p> <p>Weight : 0.23kg</p>
GMC-6MP GMC-9MP GMC-12MP GMC-16MP GMD-6MP GMD-9MP GMD-12MP GMD-16MP	3-Pole contactors <div style="display: flex; justify-content: space-around; align-items: center;"> </div>	
GMC-6MP/4 GMC-9MP/4 GMC-12MP/4 GMC-16MP/4 GMD-6MP/4 GMD-9MP/4 GMD-12MP/4 GMD-16MP/4	4-Pole contactors <div style="display: flex; justify-content: space-around; align-items: center;"> </div>	

5) Upper Frame / Lower Frame

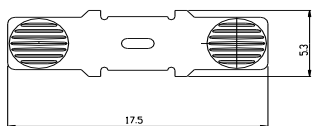
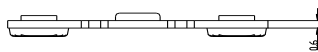
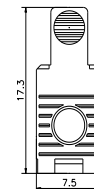
IEC 60947-4-1

Upper FrameLower Frame

6) Cross Bar / Moving Core Assembly / Fixed Core Assembly

Cross BarMoving Core AssemblyFixed Core Assembly

7) Moving Contact Assembly / Fixed Assembly

Moving Contact AssemblyFixed Assembly