



GER-M500ST-A Automotive Relay

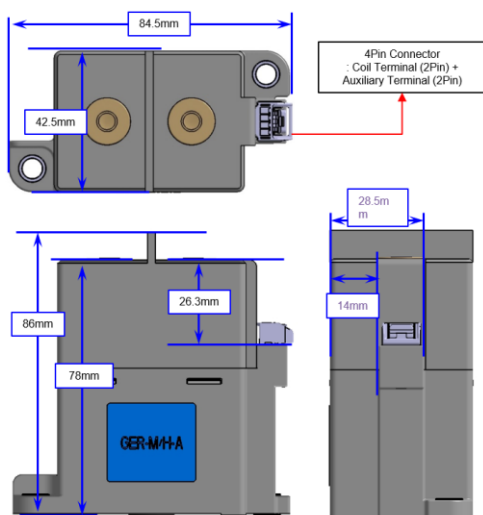
Summary

- 1,000V Main Relay for e-Mobility
- Max. Continuous Current: 500A
- This relay is equipped with an auxiliary contact.
- Electrical Life: 1) 50ops. at 400A, 450VDC
2) 10ops. At 390A, 830VDC ...

• Characteristics

Contact Arrangement		SPST-NO
Size (W x D x H)		84.5 x 42.5 x 86mm
Rated Voltage		1,000VDC
Operating Time (Max.)		30ms @20°C (25~33ms)
Release Time (Max.)		10ms @20°C (3~6ms)
Contact Voltage Drop (Initial)		0.01V @ 20A, 0.5mΩ
Aux.	Auxiliary Contact	Yes
	Auxiliary Contact Guaranteed Minimum Voltage/Current	7.5V 1.5mA 300,000ops.

Rating	Continuous Current	500A @ 85°C, 180mm ²
	Short Time Current	1400A, 20sec. @ 85°C, 180mm ²
Coil	Rated Voltage	12VDC
	Pick-up Voltage	Max. 9.0Vdc @ 85°C
	Holding Voltage	Under 6.0Vdc @ 85°C
	Drop-out Voltage	Min. 1.2Vdc @ -40°C
	Power Consumption	Under 7.2W @20°C
Expected Life	Switching On/Off	450VDC, 400A, 50ops. 830VDC, 390A, 10ops.
	Switching On	450VDC, 400A, 150ops. 830VDC, 390A, 30ops.
	Max. Cut-Off	450VDC, 2000A, 1ops. 800VDC, 1300A, 1ops. 1000VDC, 1,000A, 1ops.
	Mechanical Life	Min. 400,000ops.
	Short Circuit Current	1,000VDC, 8kA @2ms



• Dimension

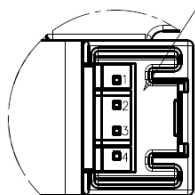
GER-M500ST-A

Unit: mm

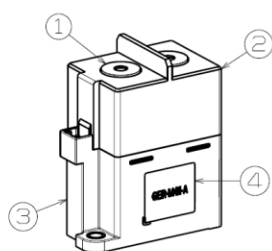
YURA 025-4F
4PIN CONNECTOR

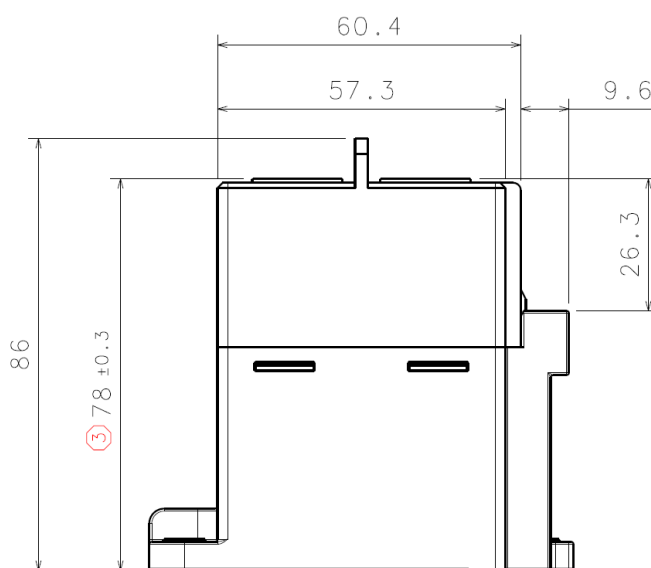
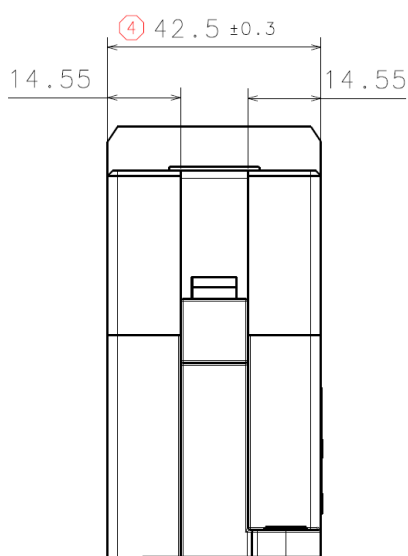
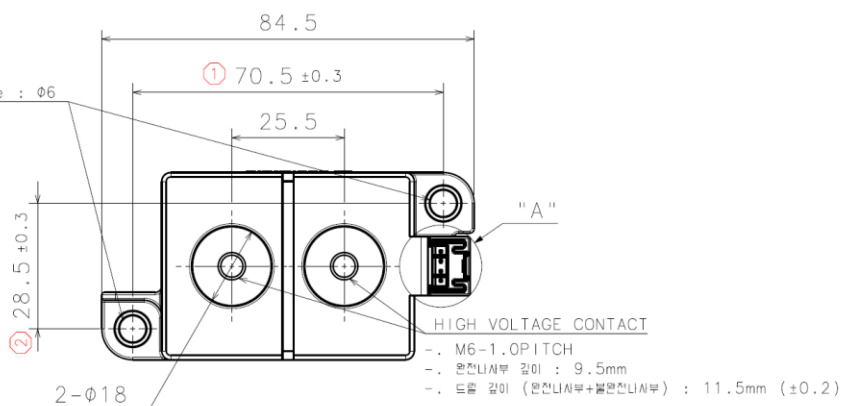
<PIN MAP>

- 1) Aux GND
- 2) Coil Vcc (12Vdc)
- 3) Coil GND
- 4) Aux Vcc (Min.5Vdc~Max.30Vdc)


Detail "A"
(Scale = 2:1)

General Tolerance

Less Than 10: ± 0.3 / 10-50: ± 0.5
More Than 50: ± 0.8

ISOMETRIC VIEW
(Scale = 1:2)

Mounting Hole Size : $\phi 6$


• Engineering Data

Switching Performance

450VDC / 400A Switching Test

4. Test results

(1) Calibration

Test voltage [V]	Test current [A]	Duty on time[ms]	Time constant[us]
454.0	403.7	603	306

(2) Result

1) 50 times

EUT No.	Test results	Verdict
#1	50 times Good	Pass
#2	50 times Good	Pass
#3	50 times Good	Pass

2) Total times

EUT No.	Test results	Verdict
#1	153 times Welding	N.A.
#2	133 times Welding	N.A.
#3	165 times Welding	N.A.

830VDC / 390A Switching Test

4. Test results

(1) Calibration

Test voltage [V]	Test current [A]	Duty on time[ms]	Time constant[us]
822.3	393.3	602	201

(2) Result

1) 30 times

EUT No.	Test results	Verdict
#1	3 times Welding	Fail
#2	30 times Good	Pass
#3	30 times Good	Pass

2) Total times

EUT No.	Test results	Verdict
#1	-	-
#2	86 times Defective operation	N.A.
#3	42 times Defective operation	N.A.

Making Performance

500A Continuous Current Test Conditions (150mm² Busbar)

4. Test results

(1) Calibration

Test voltage [V]	Test current [A]	Duty on time[ms]	Time constant[us]
450.1	402.8	68	252

(2) Result

1) 150 times

EUT No.	Test results	Verdict
#1	150 times Good	Pass
#2	150 times Good	Pass
#3	150 times Good	Pass

2) 850 times

EUT No.	Test results	Verdict
#1	850 times Good	N.A.
#2	850 times Good	N.A.
#3	850 times Good	N.A.

600A Continuous Current Test Conditions (180mm² Busbar)

4. Test results

(1) Calibration

Test voltage [V]	Test current [A]	Duty on time[ms]	Time constant[us]
820.4	393.1	606	230

(2) Result

1) 100 times

EUT No.	Test results	Verdict
#1	100 times Good	Pass
#2	100 times Good	Pass
#3	100 times Good	Pass

2) Total times

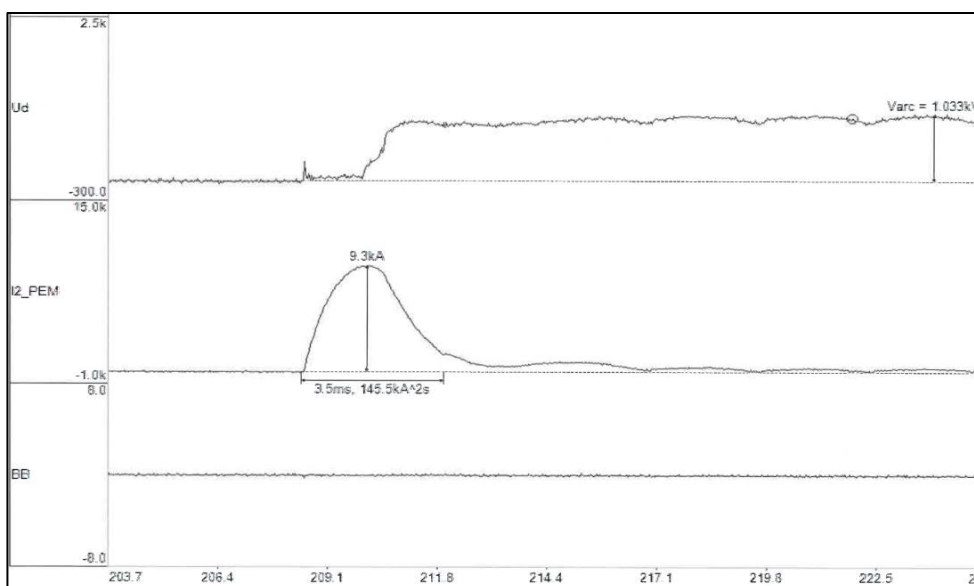
EUT No.	Test results	Verdict
#1	500 times Good	N.A.
#2	367 times Explosion	N.A.
#3	229 times Welding	N.A.

• Engineering Data

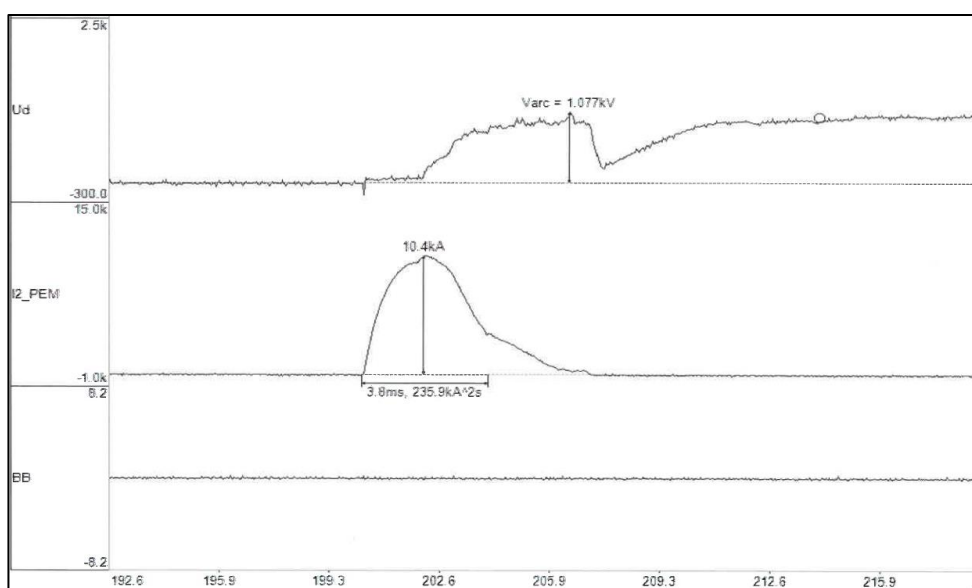
Short-Circuit Performance

DC 1000V, 8kA, Over 2ms (No Fire & Explosion)

<TEST Result> DC 1000V, 9kA, Verified for Over 2ms – Relay Welding



<TEST Result> DC 1000V, 10kA, Verified for Over 2ms – Relay Normal (No Welding)



• Engineering Data

Maximum Breaking Performance

DC1000V, 1200A Max. Cut-Off

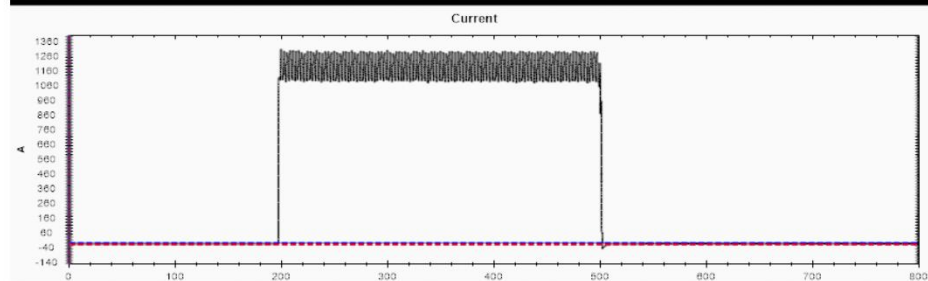
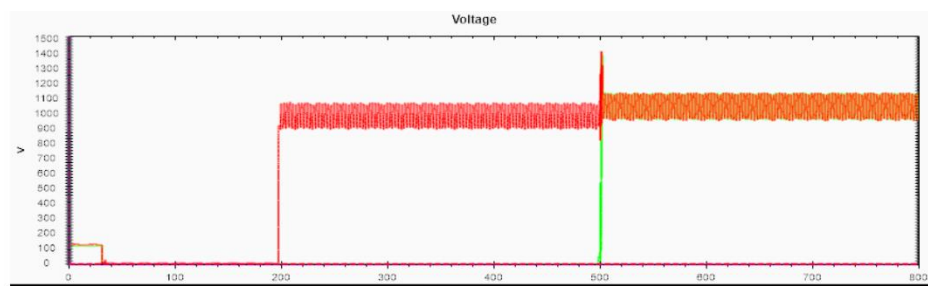
4.2 Breaking test (DC 1 000 V, 1 200 A)

□ Test condition

Number of operating cycles		0 x 1 (0.3 s on)
Circuit condition	Current	I_e (0 ~ +5)%
	Voltage	U_e (0 ~ +5)%
	Time constant	≥ 1.0 ms

□ Test results

Conditions before test	New						
Test object No.	Circuit conditions				Number of operating cycles	Arcing time [ms]	Test results
	Direction	Current [A]	Voltage [V]	Time constant [ms]			
1	Forward	1 205	1 045	0.3	1	-	Passed
2	Forward	1 205	1 045	0.3	1	-	Passed
3	Reverse	1 205	1 045	0.3	1	-	Passed



<Test object No.2, 0x1>

• Engineering Data

Mechanical Durability

Parameter	Value	Unit
On time	1	[s]
Off time	1	[s]
Number of cycles	400 000	times
Test current	1	[A]
Auxiliary circuit test voltage	7.5	[V]
Auxiliary circuit test current	1.5	[mA]

(1) Main circuit

200 000 times

EUT No.	Test results		Verdict
	Required count	Operating count	
#1	200 000	199 953	Fail
#2	200 000	200 000	Pass
#3	200 000	200 000	Pass

total

EUT No.	Test results		Verdict
	Required count	Operating count	
#1	400 000	399 953	N.A.
#2	400 000	400 000	N.A.
#3	400 000	400 000	N.A.

(2) Auxiliary circuit

200 000 times

EUT No.	Test results		Verdict
	Required count	Operating count	
#1	200 000	199 953	Fail
#2	200 000	200 000	Pass
#3	200 000	200 000	Pass

Total

EUT No.	Test results		Verdict
	Required count	Operating count	
#1	400 000	399 953	N.A.
#2	400 000	400 000	N.A.
#3	400 000	400 000	N.A.

Ordering Information (Reference)

GER – M 500 ST- A

1	2	3	4	5	6	7	8
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① GER: Green Electrical vehicle Relay
GPR: Green Power Relay

② Operating Voltage
Blank: ≤500V
M: 500-1000V
H: 1000-1500V

③ Conventional thermal Current
010: 10A 200: 200A
040: 40A 250: 250A
100: 100A 400: 400A
150: 150A 500: 500A

④ Product Type
ST: Standard parts
Customized product
- VV: Volvo
- VW: Volkswagen
- BW: BMW...

⑤ Auxiliary Contact
Blank: N/A
-A: N-O
-B: N-C

⑥ Control Voltage
Blank : DC12V
DC24V: DC24V

⑦ Mounting Type
Blank: Bottom Mounting
SM: Side Mounting
PI: Plug In Type

⑧ Main Feature
G2: New Generation 2
SL: SLIM
2CO: 2Coil Control
1CO: 1Coil Control
PWM: PWM Control
CV: Connector Vertical
48V: Rated Voltage 48V
ET: Economic Type
CYET: Cylindrical Effective Type

• Instructions for use

Main Contactor

1. Length of bolts to main contacts of relay should be 6~8mm except bus bar/terminal.
2. Contacts of relay can be oxidized in the air causing some discoloration, but there is no problem to use.
3. Excessive load input to main contacts and over-life may cause heat generation.
4. Avoid oil or foreign substances adhering to main contacts, there may be heat generation to the contacts.
5. Contact resistance may increase due to torque applied to the main contacts or vibration / shock during movement. In this case, please re-measure by applying voltage / current of actual use condition.

Mounting

1. Use the torque range specified in catalog, when tightening screws and nuts to fixed mounting or main contacts.
2. We generally recommend tightening the relays using bolts. When using nuts, the fixed mounting injection part may be pushed and broken. (Use a flat nut when using nuts.)
3. When designing the fixed mounting mounted to relay, please make sure that injection area is not pressed. Fixed mounting of the relay can be broken.
4. Relays can be assembled in forward and 90-degree rotation but cannot be assembled in 180-degree rotation.

Coil

1. Do not turn off the coil while power is supplied to the main contacts of relay. The relay may be damaged.
2. Excessive load input to coil part may cause heat generation.
3. If voltage is applied slowly to the coil, the relay may not operate. Please operate the coil promptly.
4. When load is applied to main contacts and relay coil turns on/off, coil temperature rises so that coil resistance can rise. In this case, operating voltage may exceed the rated voltage. To avoid this situation, we recommend that you take precautions such as increasing the load current, limiting voltage application time, and applying high coil voltage and nominal voltage.
5. When measuring the withstanding voltage(Initial Breakdown Voltage), measure the relay in OFF state.

Installation

1. Please avoid cross-connection as it may cause malfunction or overheating.
2. If distance between relays is close or if heat generating parts are located close to relay, be careful of temperature rise and insulation (minimum distance between relays is at least 10mm).
3. Use a conductor suitable for the specific current. Failure to meet recommended size(SQ) of conductor may cause heat problems. (It is necessary to consider the condition when installing the module)
4. When wiring, make sure that the power supply is disconnected. Relays can be damaged.

• Instructions for use

Environment

1. Use pick-up/drop-out voltage according to the operating environment. Pick-up/drop-out voltage may vary.
2. Relay life may vary depending on load type used, operating frequency, coil drive circuit and surrounding environment.
3. When using a capacitor, make sure that inrush current should not exceed the rated current of relay(95% or more capacitor charging is recommended)
4. When using inductive load L / R 1ms, measures such as installing surge absorbers in parallel should be taken in order to prevent shortening of electrical life or contact failure.
5. Do not install relays near objects that emit strong magnetic fields or heat.
6. If relays are installed close to each other or near magnetic parts such as motors and speakers, the relays may change operating characteristics or cause malfunctions. Therefore, check the performance under actual operating conditions, after installation.
7. If a product such as current sensor is installed near relay, check the performance under actual operating conditions. There may be a problem to output.
8. When pulling lead wire of the female connector on the opposite side, do not pull it with a force of more than 0.5N. There may be a problem with the product.
9. This product is not waterproof. (IP40)
10. Do not use the product in an environment where organic solvents such as alcohol, benzene, thinner, and strong alkali (ammonia or caustic soda) can easily adhere to the product.
11. Additional components should not be applied to the relay housing.
12. Please note that welding may occur in following environments : inrush current, shutdown, short circuit, low coil voltage, fuse combination
13. Make sure that resonance does not occur at relay mounting area. Vibration values guaranteed may be exceeded due to the resonance.
14. Do not use products that have fallen during use or transportation. It may cause malfunction.
15. If temperature changes suddenly, there may be a problem with current-carrying of the relay.

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