秘 YAMATAKE PROPRIETARY

SPEC

番号	改
K36684	00

名称
PGM10F015/025 TechnicalFile

認　可	山田(哲)	'06-03-02
照　査	森川	'06-03-02
担　当	浦木	'06-03-01

来 歴 記 事

改	ページ	理由・内容	担当	承認	日付

改番表																				
ページ	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
改番	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
ページ	21	22	23	24	25	26	27	28	29											
改番	00	00	00	00	00	00	00	00	00											

TÜV

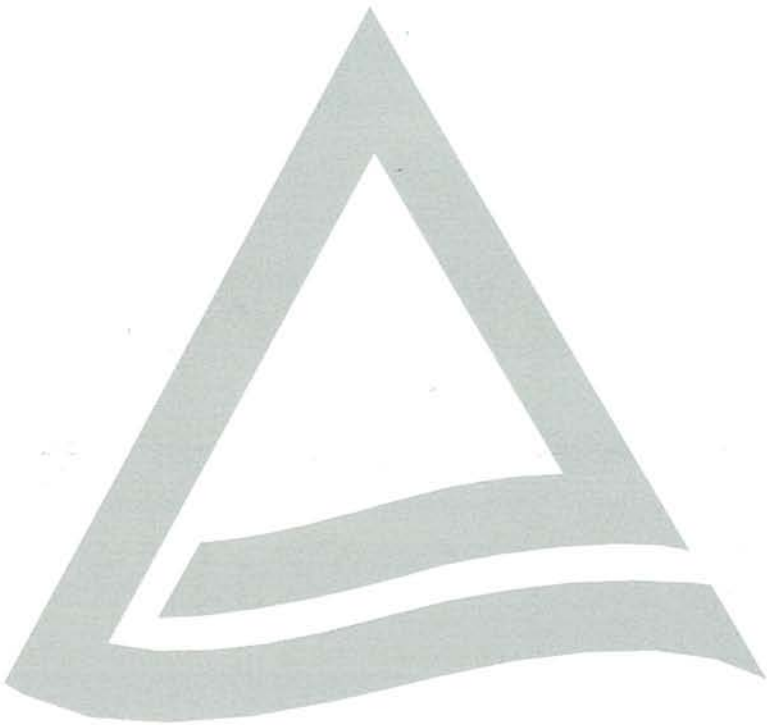
TEST REPORT

12008107 001

for

AC Semiconductor Contactor
PGM10F015 (Original:PHA15DW2RP)
PGM10F025 (Original:PHA25DW2RP)

Yamatake Corp.



This documentation consists of **28** pages (excluding this cover page).

TÜV Rheinland/
Berlin-Brandenburg Group

Am Grauen Stein
D – 51105 Köln

TÜV

Prüfbericht – Nr.: 12008107 001

Test Report No.

Auftraggeber: Applicant	**Nihon Inter Electronics Corp.** 1204 Soya, Hadano-shi, Kanagawa-Ken, Japan 257-8511		
Gegenstand der Prüfung: Test item	**AC Semiconductor Contactor**		
Bezeichnung: Identification	**PHA15DW2RP (PGM10F015)** **PHA25DW2RP (PGM10F025)**	**Serien-Nr.:** Serial No.	**NA**
Wareneingangs-Nr.: Receipt No.	**3036905**	**Eingangsdatum:** Date of receipt	**16.03.2004**
Prüfort: Testing location	**Nihon Inter Electronics Corporation** 1204 Soya, Hadano-shi, Kanagawa-ken, Japan 257-8511		
Prüfgrundlage: Test specification	**EN 60947-4-3:2000**		
Prüfergebnis: Test Result	Das vorstehend beschriebene Gerät wurde geprüft und **entspricht** oben genannter Prüfgrundlage. The above mentioned product was tested and **passed**.		

geprüft / tested by:			**kontrolliert** / reviewed by:		
Rengong Wang			Frank Becker		
24.03.2004	Rengong Wang		24.03.2004	F. Becker	
Datum Date	**Name** Name	**Unterschrift** Signature	**Datum** Date	**Name** Name	**Unterschrift** Signature

Sonstiges:
Other Aspects

Test data were taken from 12004174 001.

Tested models in test report 12004174 001 are identical to model "PGM10F015" & "PGM10F025" except for rating label.

Short circuit test (Test sequence III) was conducted at:
Institut "Prüffeld für elektrische Hochleistungstechnik" GmbH
Landsbergr Allee 378, D-12681 Berlin
Mechanical test (Test sequence IV) was conducted at:
TÜV Rheinland Japan Ltd. Yokohama laboratory
Festo Bldg. 5F, 1-26-10, Hayabuchi, Tsuzuki-ku, Yokohama 224-0025
EMC test (Test sequence V) was conducted at:
A-pex International Co., Lt. Yokowa lab.
108 Yokowa-cho, Ise-shi, Mie 516-1106 Japan

Abkürzungen:			Abbreviations:		
	Pass, P	= entspricht Prüfgrundlage		Pass, P	= passed
	Fail, F	= entspricht nicht Prüfgrundlage		Fail, F	= failed
	N/A, N	= nicht anwendbar		N/A, N	= not applicable

TÜV

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999 Test Requirements for AC semiconductor controllers/contactors for non-motor loads		
Test item particulars:		
Manufacturer ..... :	Nihon Inter Electronics Corporation	
Type designation ..... :	PHA15DW2RP	PHA25DW2RP
Form ..... :	☐ semiconductor controller (form 4) ☐ hybride controller H4xA ☐ hybride controller H4xB	☒ DOL contactor (form 5) ☐ hybride controller H5xA ☐ hybride controller H5xB
Contact configuration..... :	NO	
Contact element ..... :	Triac	
Rated operational voltage..... :	AC 75-240V (AC 75-250V)	
Frequency..... :	50/60Hz	
Rated operational current (40°C)..... :	15A	25A
Rated operational current (60°C)..... :	8A	12,5A
Utilization category ..... :	☒ AC-51 ☐ AC-55a ☐ AC-55b ☐ AC56a ☐ AC56-b	
Overload profile ..... :	See the above for A: AC-51: 1,4 x Ie – 1s: 10-320	
Conventional free air thermal current..... :	15A	25A
Heat sink specification..... :	Integrated	
Rated conditional short-circuit current..... :	900A	1500A
Short-circuit protection device ..... :	CR2LS-20	CR2LS-30
Short-circuit coordination..... :	☒ type 1	☐ type2
Rated supply voltage ..... :	----	
Rated input ..... :	----	
Rated control voltage..... :	DC 4,5 - 30V	
Rated control current..... :	max. 15mA	
Number of inputs ..... :	1	
Rated insulation voltage ..... :	250Vac	
Overvoltage category / U_{imp} ..... :	II / 2,5kV	
Pollution degree..... :	2	
Class of equipment ..... :	None	
Insulation system (supply/control - contacts). ..	basic insulation	
Insulation system (live - earth)..... :	reinforced insulation (heatsink)	

TÜV

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999

Test item particulars (continued):	
Max. specified ambient temperature (°C) .....:	80°C
Minimum mounting distance..... .....:	Single mounting
Mounting position..... .....:	any
IP-degree..... .....:	IP00

General remarks:

"(see remark #)" refers to a remark appended to this test report.

"(see Attachment #)" refers to a document attached to this test report.

Throughout this report a comma is used as the decimal separator.

"n.n." (not noted) is used for unknown / not recorded items

Explanation of abbreviations, if used in this test report:

SSC:	soild state contactor (semiconductor DOL contactor)	pri :	primary
PE:	protective earth	sec:	secondary
CB:	circuit breaker	gnd:	ground
MTR:	motor	I/O:	input/output
PCB:	printed circuit (wiring) board	SCPD:	short-circuit protection device
∧:	and	NC:	normally closed
∨:	or	NO:	normally open
U_S:	supply voltage		

Description of the test item:

Differences between the models:

Reference to the specifications.

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict
5	**CHARACTERISTICS OF A.C. SEMICONDUCTOR CONTROLLERS AND CONTACTORS**		**P**
5.2	**Type of equipment**		**P**
5.2.1	**Form of equipment**	form 5	**P**
5.2.2	**Number of poles**	1	**P**
	Number of main poles	1	**P**
	Number of main poles where the operation is controlled by a semiconductor switching element	1	**P**
5.2.3	**Kind of current**	AC	**P**
5.2.4	**Interrupting medium** (applicable only to mechanical switching devices of hybrid controllers and contactors)		**N**
5.2.5	**Operating conditions of the equipment**		**P**
	Method of operation	controlled by one triac	**P**
	Method of control	remote, by control input	**P**
	Method of connecting	single-phase load	**P**
5.3	**Rated and limiting values for main circuits**		**P**
5.3.1	**Rated voltages**		**P**
	Rated operational voltage Ue ..... [V]:	AC 75 - 250V	**P**
	Rated insulation voltage Ui ..... [V]:	250	**P**
	Rated impulse withstand voltage Uimp ..... [V]:	2,5kV	**P**
5.3.2	**Rated currents**		**P**
	Conventional free air thermal current Ith ..... [A]:	PHA15DW2RP : 15A PHA25DW2RP : 25A	**P**
	Conventional enclosed thermal current Ithe ..... [A]:		**N**
	Rated operational current Ie ..... [A]:	PHA15DW2RP : 15A PHA25DW2RP : 25A	**P**
	Rated uninterrupted current Iu ..... [A]:	PHA15DW2RP : 15A PHA25DW2RP : 25A	**P**
5.3.3	**Rated frequency**	50-60Hz	**P**
5.3.4	**Rated duty**	continuously	**P**
	Ratio of the on-load period to the total period (F) ..... [%]	100	**P**

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict
	Number of operating cycles per hour (S) .....:		**N**
5.3.4.1	Eight-hour duty		**N**
5.3.4.2	Uninterrupted duty		**P**
5.3.4.3	Intermittent periodic or intermittent duty		**N**
	On-load factor ..... [%]:		**N**
	Number of operating cycles per hour .....:		**N**
	$\int i^2dt \leq Ith^2 \times T$		**N**
	$\int i^2dt \leq Ithe^2 \times T$		**N**
5.3.4.4	Temporary duty		**N**
5.3.4.5	Periodic duty		**N**
5.3.5	**Normal load and overload characteristics**		**P**
5.3.5.1	Overload current profile		**P**
	Overload current as a multiple of Ie (X) .....:	1,4	**P**
	Sum of duration times for the operational overload currents (Tx) .....:	1s	**P**
5.3.5.3	Switch-on, ramp-up, ramp-down and load control characteristics	simple contactor function	**P**
5.3.6	**Rated conditional short-circuit current ..... [kA]:**	PHA15DW2RP : 0,9 PHA15DW2RP : 1,5	**P**
5.4	**Utilization category**	AC-51	**P**
	Highest value of $(XIe)^2 * Tx$ .....:	tested ratings assigned only	**N**
	Highest value of F * S or OFF-time .....:	tested ratings assigned only	**N**
5.5	**Control circuits**		**P**
	Kind of current	DC	**P**
	Power consumption .....[VA]:	max. 0,45W (specified:15mA)	**P**
	Rated frequency (or d.c.).....[Hz]:		**N**
	Rated control circuit voltage Uc.....[V]:	4,5V ~ 30V	**P**
	Rated control supply voltage Us.....[V]:		**N**
	Nature of control circuit devices		**N**

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict
5.6	**Auxiliary circuits**		**N**
	Number of contacts		**N**
	Kind of contacts		**N**
	Intended function		**N**
5.8	**Coordination with short-circuit protective devices (SCPD)**		**P**
	Type of SCPD	fuse	**P**
	Rating and characteristics of SCPD	CR2LS-20: 20A CR2LS-30: 30A characteristics according to IEC 60269-4	**P**
6	**PRODUCT INFORMATION**		**P**
6.1	**Information shall be given on the nameplates:**	☒ see attachment(s) A1	**P**
	a: Manufacturer's name or trade mark	**NI** Nihon Inter Electronics Corp. **Yamatake** Yamatake Corp.	**P**
	b: type designation or serial number	example: PHA15DW2RP	**P**
	c: Number of standard: IEC 60947-4-3	IEC 60947-4-3	**P**
	l: IP code, in case of enclosed equipment		**N**
	Information shall be given either on the nameplates, or on the equipment, or in the manufacturer's published literature:		—
	d: rated operational voltages	75 ~ 250V	**P**
	e: rated operational currents	15A and 25A	**P**
	f: rated frequency/frequencies	50-60Hz (in literature)	**P**
	g: indication of the rated duties		**N**
	h: form designation	form 5 (in literature)	**P**
	j: rated insulation voltage	250V (in literature)	**P**
	k: rated impulse withstand voltage	2,5kV (in literature)	**P**
	m: pollution degree	2 (in literature)	**P**

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict
	n: rated operational short-circuit current and type of co-ordination of the controller and the type, current rating and characteristics of the associated SCPD	900A and 1500A type 1 20 / 30A fuse IEC 60269-4 (in literature)	P
	p: switching overvoltages	under consideration	N
	q: rated control circuit voltage Uc, nature and rated frequency	DC 4,5 - 30V	P
	rated control supply voltage Us, nature and rated frequency		N
	r: nature and ratings of auxiliary circuits		N
	t: equipment class	class A (marked)	P
	u: immunity level	1 (in literature)	P
6.3	**Instructions for installation, operation and maintenance**		N
	Information shall be provided by the manufacturer to advise the user on the measures to be taken with regard to the equipment in the event of short circuit and in connection with the requirements for EMC.	EMC-Warning Label attached, since the limits for class B (domestic) are exceeded. Type 1 short circuit co-ordination, fuses specified in the literature (CDF). Further information not required.	P
7	**NORMAL SERVICE, MOUNTING AND TRANSPORT CONDITIONS**		----
8	**CONSTRUCTIONAL AND PERFORMANCE REQUIREMENTS**		P
8.1	**Constructional requirements**		P
8.1.1	**Materials**		P
	Resistance to abnormal heat and fire	Glow-wire test 850°C for base and cover	P
8.1.2	**Current carrying parts and connections**		P
	Current carrying parts shall have the necessary mechanical strength		P

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict

8.1.3	**Creepage distances and clearances**				**P**
	Overvoltage category	II / 2.5kV			----
	Pollution degree	2			
	Material group	III			
	required values:				
	- basic insulation, clearance:	1,5 mm			
	- basic insulation, creepage:	1 mm (PCB)			
	- reinforced insulation, clearance:	3 mm			
	- reinforced insulation, creepage:	2,5 mm (PCB)			
	measured values (minimum):	☒ see attachment(s) A2			**P**
	- basic insulation, clearances:	No.	location	distance [mm]	**P**
		1	Optocoupler pin prim./sec.	4,4	
		2	Control screw terminal 3 to primary terminal 1 through hole.	4,8	
		3	Control screw terminal 4 to primary terminal 2 on solder side.	3,3	
		4	Control screw terminal 4 to track of R3 on component side.	5,1	
		5	Control terminal 3 edge to HV photocoupler solder pin	4.3	
	- reinforced insulation, clearances:	No.	location	distance [mm]	**P**
		6	Track of primary terminal 2 to heatsink over ceramic PCB.	4,2	
	Remarks:				

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict

	- basic insulation, creepage distances:	No.	location	distance [mm]	P
		1	Optocoupler pin prim./sec.	4,4	
		2	Control screw terminal 3 to primary terminal 1 through hole.	5,4	
		3	Control screw terminal 4 to primary terminal 2 on solder side.	3,3	
		4	Control screw terminal 4 to track of R3 on component side.	5,1	
	- reinforced insulation, creepage distances:	No.	location	distance [mm]	P
		6	Track of primary terminal 2 to heatsink over ceramic PCB.	4,2	
	Remarks:				

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict

8.1.7	**Terminals**			**P**
	Constructional requirements			**P**
	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength			**P**
	Terminal connections shall be such that necessary contact pressure is maintained			**P**
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal			**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			**P**
	Connecting capacity			----
		control	main	
	type of conductors ..... :	flexible	flexible	
	minimum cross-sectional area of conductor (mm^2) ..... :	0,5	2,5	
	maximum cross-sectional area of conductor (mm^2) ..... :	1,5	6,0	
	number of conductors simultaneously connectable to the terminal ..... :	2	1	
	Connection			**P**
	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**
	Terminal identification and marking			**P**
	terminal intended exclusively for the neutral conductor			**N**
	protective earth terminal	Distance between substrate pattern and heatsink is about 4,4mm and by use the values of printed wiring boards considered as reinforced insulated (required: 3mm for rated insulation voltage of 250V, Uimp = 2kV).		**N**

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict
	other terminals		N
	Withdrawable parts shall have a connected and a removed position and in addition a disconnected position and may have a test position.		N
8.1.9	**Provisions for earthing**		P
	Constructional requirements		N
	The exposed conductive parts shall be electrically interconnected and connected to a protective earth terminal	Heat sink with provisions for rail-mounting. See below.	N
	Protective earth terminal		N
	The protective earth terminal shall be readily accessible	Distance between substrate pattern and heatsink is about 4,4mm and by use the values of printed wiring boards considered as reinforced insulated (required: 3mm for rated insulation voltage of 250V, Uimp = 2kV).	N
	The protective earth terminal shall be suitably protected against corrosion		N
	The electrical continuity between the exposed conductive parts of the protective earth terminal and the metal sheathing of connecting conductors		N
	The protective earth terminal shall have no other functions		N
	Protective earth terminal marking and identification		N
	The protective earth terminal shall be clearly and permanently identified by its marking.		N
8.1.10	**Enclosures for equipment**		N
	Design		N
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible		N
	Sufficient space shall be provided inside the enclosure		N

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict
	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**
	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**
	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**
	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**
	Insulation		**N**
	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**
8.1.11	**Degrees of protection of enclosed controllers and contactors**		**N**
	Degrees of protection against access to hazardous parts against ingress of solid foreign objects indicated by the first characteristic numeral	IP00	**N**
	Degrees of protection against ingress of water indicated by the second characteristic numeral		**N**
	Degrees of protection against access to hazardous parts indicated by the additional letter		**N**
8.2	**Performance requirements**		**P**
8.2.1	**Operating conditions**		**P**

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict
9	**TESTS**		**P**
9.3	**Compliance with performance requirements**		**P**
9.3.1	**Test sequences**		**P**
	Each test sequence is made on a new sample.		**P**
	The tests are to be conducted in the sequence given for each sample.		**P**
	TEST SEQUENCE I		**P**
9.3.3.3	Verification of temperature rise		**P**
9.3.3.3.1	Ambient air temperature		**P**
	The ambient temperature shall be recorded during the last quarter of the test period by at least two temperature sensing means.		**P**
	The ambient temperature shall be between +10°C and +40°C and shall not vary more than 10K.	PHA25DW2RP 23,8°C – 21,0°C max. variation: 2,8K PHA15DW2RP 24,3°C – 21,2°C max. variation: 3,1K	**P**
9.3.3.3.4	Temperature rise of the main circuit		**P**
	Dimensions of test enclosure WxHxD .....[mm]:		**N**
	Temperature sensing means shall be attached to the outer surface of the case of the semiconductor switching devise that is most likely to produce the highest temperature rise.	PHA25DW2 RP / PHA15DW2 RP	**P**
	Test voltage for control circuits..... [V]:	30V DC / 30V DC	
	Cross-section of connections ..... [mm^2]:	AWG 10 / AWG 10	
	Length of connections .....[m]:	> 1 / > 1	
	Test current for main circuits..... [A]:	250V, 15A / 250V, 25A	
	Test current for auxiliary circuits..... [A]:	---- / ----	
	Final case temperature Cf .....[°C]:	89,9 (25A) 59,6 (12,5A) / 64,0 (15A) 44,0 (8A)	
	Final ambient temperature Af.....[°C]:	22,0 (for terminals) 28,1 (for case) / 22,0 (for terminals) 28,1 (for case)	

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict

	Measured (M), required (R)	M	R	M	R	
	Temperature rise of main circuit terminals..... [K]:	31,1	65	49,1	65	
	Temperature rise of auxiliary circuit terminals . [K]:	----	----	----	----	
	Temperature rise of control circuit terminals.... [K]:	16,1	65	23,7	65	
	Temperature rise of base plate ..... [K]:	----	----	----	----	

9.3.3.4	Verification of dielectric properties		**P**
9.3.3.4.1	Type tests		**P**
9.3.3.4.1 1)	General conditions for withstand voltage tests		**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 of the mounting plate.		**P**
9.3.3.4.1 2)	Verification of impulse withstand voltage		**N**
	Test voltage ..... [V]:		
	1.2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum.		
	Application of test voltage:		
	i) between all the terminals of the main circuits connected together and the enclosure or mounting plate, with the contacts, if any, in all normal positions of operation		**N**
	ii) for poles of the main circuit declared galvanically separated from the other poles: between each pole and the other poles connected together and to the enclosure or mounting plate, with the contacts, if any, in all normal positions of operation		**N**
	iii) 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, which, wherever appropriate, may be connected together		**N**

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict
	iv) for equipment suitable for isolation, across the poles of the main circuit, the line terminals being connected together and the load terminals connected together.		**N**
	There shall be no unintentional disruptive discharge during the tests.		**N**

9.3.3.4.1 3)	Power-frequency withstand verification of solid insulation		**P**
	Test voltage for main circuits..... [V]:	L – E: 4000V *) In – Out: 2000V	
	Test voltage for control and auxiliary circuits .. [V]:		
	Frequency of test voltage ..... [Hz]:	60	
	The test voltage shall be applied to for 5s in accordance with items i), ii) and iii) of 9.3.3.4.1 3).	1min *) L – E: Main circuit → heatsink	
	During the test, no flash-over, breakdown of insulation or any manifestation of disruptive discharge shall occur.		**P**

	TEST SEQUENCE II			**P**
9.3.3.6.1	Thermal stability test			**P**
		PHA25DW2 RP	PHA15DW2 RP	
	Initial case temperature C_0 .....[°C]:	24,2	23,7	
	Initial ambient temperature A_0 .....[°C]:	22,0	24,6	
	Test current I_T ..... [A]:	34,4	21,9	
	Test voltage U_T ..... [V]:	250	250	
	Test voltage for control circuits..... [V]:	33	33	
	Time interval Tx ..... [s]:	1,4	1,4	
	Temperature-rise change factor Δ .....[10^{-3}]:	0,00587	0,00676	
	Total time t .....[h:min]:	36:15	17:38	
	No visual evidence of damage (i.e. smoke, discoloration).			**P**
9.3.3.6.2	Overload capability test			**P**
9.3.3.6.2 2)	EUT (equipment under test) adjustments			**N**

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict
	EUT shall be adjusted to minimize the time to establish the test current level.		N
	EUT fitted with a current-limit function shall be set to the highest value of X specified for Ie.		N
9.3.3.6.2 3)	Test		P
	Utilization category.....:	AC-51	
	Ic/Ie .....:	1,4	
	Ur/Ue.....:	1,1	
	Cosφ.....:	0,8	
	ON-time.....[s]:	1	
	OFF-time.....[s]:	10	
	Number of operating cycles.....:	5	
	No visual evidence of damage.		P
	No loss of commutating capability, blocking capability, functionality.		P
9.3.3.6.3	Blocking and commutating capability test		P
	The EUT is mounted and connected as in normal use with cable length between the EUT and the test load of not greater than 10m.	PHA25DW2 RP / PHA15DW2 RP	P
	Utilization category.....:	AC-51	
Test 1	100 operating cycles with 0.85Ue and 0.85Us.	100	P
	Test voltage U(Ue) ..... [V]:	63,75	
	U/Ue.....:	0,85	
	Voltage U_0 across each pole of the EUT ..... [V]:	67,4 / 64,5	
	Variation in voltage across each pole ΔU.....:	$2\ 10^{-3}$ / $0,8\ 10^{-3}$	
	Test current..... [A]:	34,2 / 22,0	
	Cosφ.....:	1 / 1	
	ON-time.....[s]:	1 / 1	
	OFF-time.....[s]:	2 / 2	
	Test voltage U(Us)..... [V]:	3,825	
	U/Us .....:	0,85	

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict

Test 2	1000 operating cycles with 1.1Ue and 1.1Us.	1000		P
	Test voltage U(Ue) ..... [V]:	275		
	U/Ue.....:	1,1		
	Voltage U_0 across each pole of the EUT ..... [V]:	275	275,16	
	Variation in voltage across each pole ΔU.....:	$0,8\ 10^{-3}$	$4,8\ 10^{-3}$	
	Test current..... [A]:	35,2	22,0	
	Cosφ.....:	1	1	
	ON-time.....[s]:	1	1	
	OFF-time.....[s]:	2	2	
	Test voltage U(Us)..... [V]:	33		
	U/Us .....:	1,1		
	The variation in voltage across each pole ΔU shall be smaller than 0.10 for each pole.			P
	No visual evidence of damage (i.e. smoke, discoloration).			P
	No loss of functionality as specified by the manufacturer.			P

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict

	TEST SEQUENCE III			**P**
9.3.4	**Performance under short-circuit conditions**			**P**
9.3.4.1	General conditions for short-circuit tests			**P**
	Initial case temperature shall be not less than 40°C.			**P**
9.3.4.1.2	Test circuit for the verification of short-circuit ratings			**P**
	For type 1 coordination, the fusible element F and the resistance RC are replaced by a solid 6mm^2 wire 1.2m to 1.8m in length, connected to the neutral.			**P**
9.3.4.1.6	Test procedure	PHA25DW2RP	PHA15DW2RP	**P**
	Type of SCPD ..... :	fuse (IEC 60269-4)		
	Ratings of SCPD, co-ordination type 1 ..... :	----	----	
	Ratings of SCPD, co-ordination type 2 ..... :	30A	20A	
	Maximum operational current Ie .....[A]:	25A	15A	
	Prospective current "r" .....[kA]:	0,907	1,54	
	R.m.s. test current .....[A]:	n.n	n.n	
	Peak current .....[A]:	n.n	n.n	
	Power factor..... :	0,94	0,91	

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict
9.3.4.3.3	Results to be obtained		P
	For both types of coordination:		P
	A - the fault current has been successfully interrupted by the SCPD or the combination starter 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.		N
	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
	Type 1 coordination:		P
	E - there has been no discharge of parts beyond the enclosure. Damage to the contactor and the overload relay is acceptable. The contactor or the controller may be inoperative after the test.		P
	Type 2 coordination:		N
	F - no damage to the overcurrent protective means or other parts has occurred and no replacement of parts is permitted during the tests. For hybrid controllers and contactors, welding of contacts is permitted, if they are easily separated without significant deformation.		N
	G - the tripping of the overcurrent protective means shall be verified at a multiple of the current setting and shall conform to the published tripping characteristics both before and after the short-circuit test.		N
	H - the adequacy of the insulation shall be verified by a dielectric test on the controller or contactor.		N

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict

	TEST SEQUENCE IV		**P**
IV.1	**Verification of mechanical properties of terminals**		**P**
IV.1.1	**Test for insertability of unprepared round copper conductors having the maximum specified cross section**		**P**
	gauge ..... :	control circuit only	---
	gauge penetrates freely into the terminal aperture to the full depth of the terminal	control circuit only	**P**
	Mechanical strength of terminals		**P**
	maximum cross-sectional area of conductor (mm²) :	Control: 1,5 main: 6,0	---
	diameter of thread (mm) ..... :	Control: M3,5 main: M4	---
	torque (Nm) ..... :	Control circuit: tested : 0,8 Nm Main circuit: tested : 1,2 Nm	---
	5 times on 2 separate clamping units		**P**
IV.1.2	**Testing for damage to and accidental loosening of conductor (flexion test) -** part 1 *Terminals loaded with the max. number of conductors of the smallest cross-sectional area*		**P**
	conductor of the smallest cross-sectional area (mm²) ..... :	Control circuit: 0,5 main: 2,5	---
	number of conductor of the smallest cross section :	1	---
	diameter of bushing hole (mm) ..... :	Control circuit: 6,4 main: 9,5	---
	height between the equipment and the platen (mm) ..... :	Control circuit: 260 main: 279	---
	mass at the conductor(s) (kg) ..... :	Control circuit: 0,5mm² → 0,3kg Main: 2,5mm² → 0,7kg	---
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		**P**

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict
IV.1.3	**Pull-out test - part 1**		**P**
	force (N) ..... :	Control circuit: 0,5mm² → 30 N Main: 2,5mm² → 50 N	---
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		**P**
IV.1.2	**Flexion test - part 2** *Terminals loaded with the max. number of conductors of the largest cross-sectional area*		**P**
	conductor of the largest cross-sectional area (mm²) ..... :	control circuit: 1,5 main: 6,0	---
	number of conductor of the largest cross-sectional :	1	---
	diameter of bushing hole (mm) ..... :	Control circuit: 6,4 Main: 9,5	---
	height between the equipment and the platen (mm) ..... :	Control circuit: 260 main: 279	---
	mass at the conductor(s) (kg) ..... :	Control circuit: 1,5mm² → 0,4kg Main: 6,0mm² → 1,4kg	---
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		**P**
IV.1.3	**Pull-out test - part 2**		**P**
	force (N) ..... :	Control circuit: 1,5mm² → 40 N Main: 6,0mm² → 80 N	---
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		**P**
IV.2	**Verification of degrees of protection of enclosed equipment**		**N**
	Requirements of Annex C of IEC 60947-1.		**N**

	TEST SEQUENCE V		**P**
9.3.5	**EMC tests**	refer to Test Report 12004175 001	**P**
9.3.5.1	EMC emission tests		**P**
9.3.5.2	EMC immunity tests		**P**

EN 60947-4-3:2000 ≡ IEC 60947-4-3:1999			
Clause	Requirement – Test	Result - Remark	Verdict

Attachments:

Attachment A1: Drawings of marking labels (3 pages)

Attachment A2: Drawings of clearances and creepage distances (2 pages)

Attachment A3: Test equipment list (Manufacturers) (1 pages)

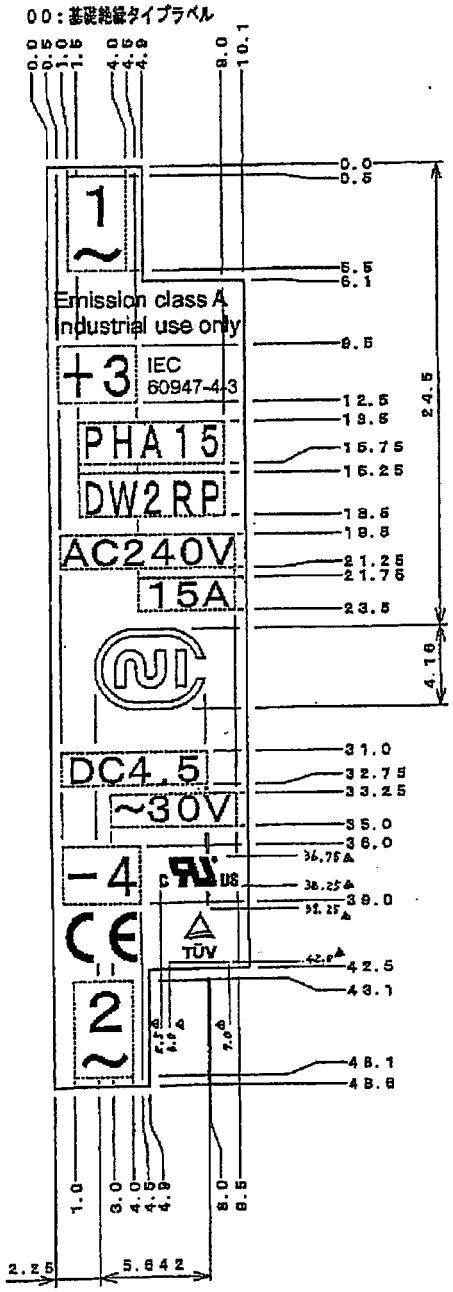
--- END OF TEST REPORT ---

受入検査項目				改訂	記号	日付	来歴
記号	項目	規格値	測定機器				
a							
b							
c							
d							
e							

△12008107 001

△ Attachment A1・1/3

00：基礎絶縁タイプラベル

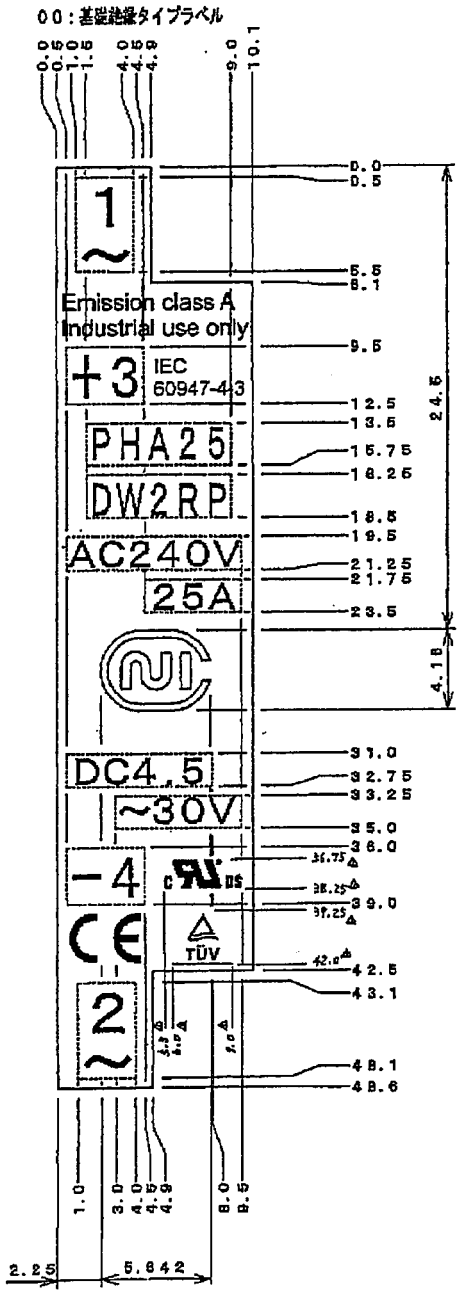


三角法	承認	審査	製図	設計	作成	2003.03.17	図名	マーキング仕様
一般寸法公差(単位mm)					処理		品名	型式ラベル
寸法値 / 外形部 / 取付部								
6以下 ±0.2 ±0.1					材質		型式	PHA15DW2RP
6~30 ±0.4 ±0.2								
30~50 ±0.7 ±0.3	株式会社ジェルシステム				尺度	—	図番	T-0308001
50以上 ±1.1 ±0.5								

受入検査項目				改訂	記号	日付	来歴
記号	項目	規格値	測定機器				
a							
b							
c							
d							
e							

△12008107 001

△ Attachment A1・2/3

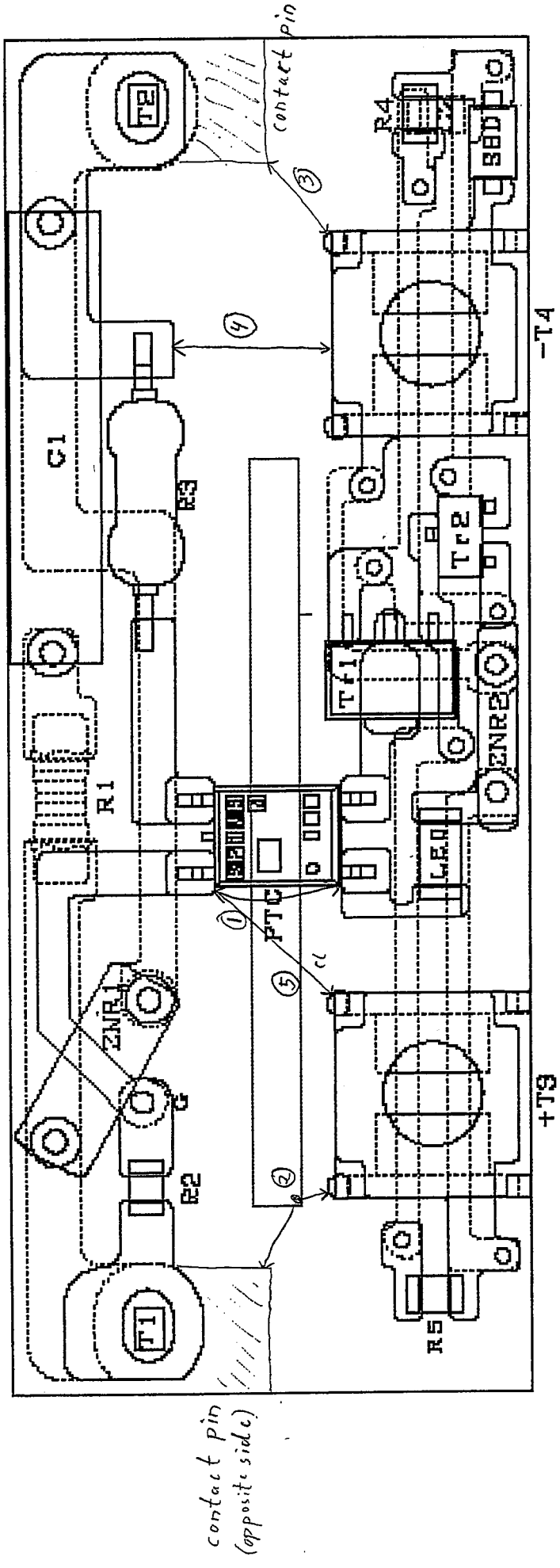


三角法	承認	審査	製図	設計	作成	2003.03.17	図名	マーキング仕様
一般寸法公差(単位mm)					処理		品名	型式ラベル
寸法値 / 外形部 / 取付部								
6以下 ±0.2 ±0.1					材質		型式	PHA25DW2RP
6~30 ±0.4 ±0.2								
30~50 ±0.7 ±0.3	株式会社ジェルシステム				尺度	−	図番	T−0308002
50以上 ±1.1 ±0.5								


1
IEC 60947-4-3
c UL us
+3
Emission class A industrial use only
CE
YAMATAKE
PGM10F
025
AC240V
25A
DC4.5-30V
-4
TÜV
MADE IN JAPAN
2

△12008107 001

△ Attachment A2 · 1 / 2

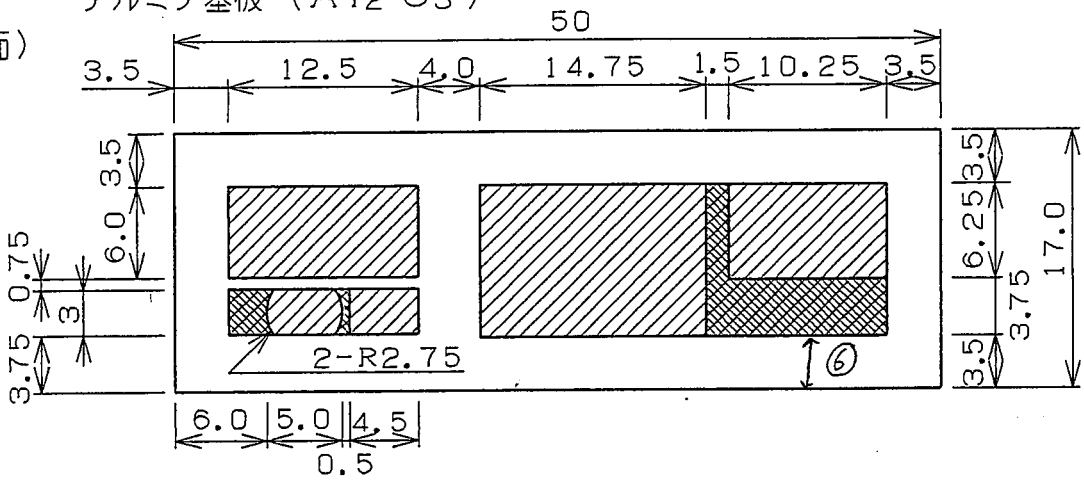


PHA15DW2RP／PHA25DW2RP

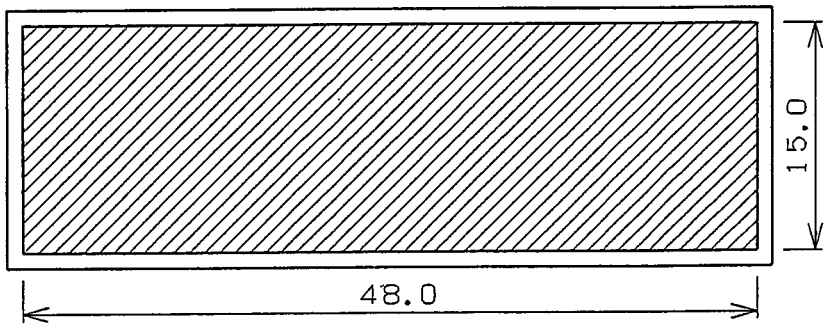
絶縁基板図面

銅張りアルミナ基板
アルミナ基板（Al2 O3）

（表面）



（裏面）



t＝0.63

：導体部
表面Cu厚：0.3
裏面Cu厚：0.3

：ソルダーレジスト部

2002. 12. 25

Nihon Inter Electronics Corporation

Measuring and Test Equipment List

測定器名 Measuring instrument name	Type	メーカー名 Manufacturer name	Serial No	校正日 Proofreading	備考欄 Reference column
電圧計 Voltmeter	2052 (CLASS 1.5)	横河電機(株) YOKOGAWA Electric Corporation	3CU1033	2002.12.13	
電圧・電流計 Voltmeter & Ammeter	2014 (CLASS 0.5)	横河電機(株) YOKOGAWA Electric Corporation	M1J174	2002.12.13	
直流電源 DC Power Supply	PAB 32-2A	菊水電子工業(株) KIKUSUI ELECTRONICS CORP.	4712793	2002.12.13	
直流電源 DC Power Supply	PAB 250-0.25A	菊水電子工業(株) KIKUSUI ELECTRONICS CORP.	2940271	2002.12.13	
直流電源 DC Power Supply	PAB No.3	菊水電子工業(株) KIKUSUI ELECTRONICS CORP.	No.3	2002.12.13	
パルス カレント トランス Pulse Current Transformer	301X	PEARSON ELECTRONICS.INC.	20624	2002.12.13	
マルチメーター MULTMETER	VOAC 7412	岩崎通信機(株) IWATSU ELECTRIC CO., LTD.	12671159	2002.12.13	
温度記録計 Temperature record meter	NR-1000	(株)キーエンス KEYENCE CORPORATION	1502101D	2002.12.13	
絶縁試験機 Withstanding Voltage tester	TOS 8750	菊水電子工業(株) KIKUSUI ELECTRONICS CORP.	26120344	2001.12 実施 2002.12 次回	
オシロスコープ Digital Oscilloscope	2430A	ソニーテクトロニクス SONY／TEKTRONIX COPR.	J301094	2001.12 実施 2002.12 次回	
SSR マルチテスター SSR Multi-tester	6号機	日本制御システム株式会社	No.6	2002.11 実施 2005.11 次回	

Signature: Masanori Ehara

Masanori Ehara

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△ Attachment A3. 1/1