Document No.: TCI-0003E-M-ACU
Control Dept: Electrical Engineering

INSTRUCTION MANUAL

for Maintenance

WELD CONTROL FOR STATIONALY SPOT WELDER
NWC-900 series

Original instructions

The instruction manual must be carefully
read for proper machine operation.

No person is allowed to install, conduct test run of, operate, maintain, repair the machine or do similar works, without having well understood what the manual refers to.
The improper operation with inadequate knowledge may cause serious accident. Incidentally, the manual must be kept at a place accessible to any of the person concerned.

Please inquire an uncertain point of our Sales Department/each office.

DENGENSHA

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NOTICE

1. Please do not reprint contents of this instruction partially without permission.
2. The content of Instruction manuals might change without notifying beforehand.
3. Please contact us when there are any suggestions like an uncertain by any chance point, mistake, and description leakage, etc.

Revision history

3	Change signal name	2010/ 12/29	Nakano	福 '11.1.07 田	落 '11.1.07 合
2	Change Temper cool cycle Change Program sheet	2010/ 09/21	Nozaki	Fukuta 2010/ 09/22	Ochiai 2010/ 09/22
1	Parts code is added to fuse.	2010/ 08/31	T.Nakano	Fukuta 2010/ 08/31	Ochiai 2010/ 08/31
-	First edition	2010/ 08/18	M.Arima	Fukuta 2010/ 08/18	Ochiai 2010/ 08/18
Revision code	Revision item	Date	Drawn	Verification	Approved

Instruction manuals

Instruction manuals are provided individually for the welder (Installation, operation, maintenance), program box, monitor box and Special function.

- Resistance welder control unit instruction manual (for maintenance) This document

  This manual provides instructions regarding the resistance welder control unit main body, descriptions of the control unit (timer unit) functions, notes of operation, such as the installation method, troubleshooting against errors and maintenance.

- Program box ・Monitor program box instruction manual
  Separate volume

  This manual provides instructions regarding the program box and monitor box used as a monitor for a resistance spot welder control unit, such as setting of program data, key operations necessary for monitor display and display data.

Contents

1. AFETY INSTRUCTIONS AND CONSIDERATIONS

IT IS IMPERATIVE THAT :

Any person involved with the installation, functional testing, operation, maintenance and repair of this machine must start the work with complete understanding of the machine after reading this INSTRUCTION MANUAL carefully, to help prevent personal injury or damage to the equipment. DENGENSHA equipment has been designed and produced with due consideration to safety. Be sure to observe the instructions in this instruction manual. Failure to comply with these instructions may cause personal injury.

1 - 1. Product safety labels and symbols

In this manual and the machine, the following labels or symbols are used.

(1) General warning sign

	This is the general warning sign. It is used to alert the user to potential hazards. All safety messages that follow this sign shall be obeyed to avoid possible harm.

(2) Hazard severity panels

	**DANGER**	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	**WARNING**	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	**CAUTION**	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

(3) Prohibition sign

	A black graphical symbol inside a red circular band with a red diagonal bar defines a safety sign that indicates that an action shall not be taken or shall be stopped.

(4) Mandatory action

	A white graphical symbol inside a blue circle defines a safety sign that indicates that an action shall be taken to avoid a hazard.

1 - 2. Application of the equipment and safety

This equipment is intended for use, exclusively, for the purpose specified in associated documentation (instruction manual, specification sheet). Employment of the equipment for any other purpose is regarded as a deviation from the intended application.

Improper usage other than intended may cause :

(a) Serious injury or death,

(b) Damage to this and/or other equipment

DENGENSHA equipment uses the latest state of the art technology and is made to operate safely and reliably. The equipment should be used only for the intended purpose. Dengensha will not accept liability for misuse of the equipment.

1 - 3. Safety considerations

We emphasize that DENGENSHA MFG.CO., LTD. disclaims all liability for damage and malfunctions resulting from non-compliance with the following instructions in particular :

(a) The instruction manual must be read and strictly understood. If there are any questions, contact our business department and/or each office.

(b) Unauthorized conversion and/or modification affecting the safety of the equipment are not allowed.

(c) The equipment may not be equipped or operated with products of other manufacturers whose use is not expressly permitted in the associated manuals.

(d) For the items(b)and(c), consult with our business department/each office on safety.

1 - 4. Safety during operation

CAUTION
(1) Injury prevention from electrode or clamping force Resistance welding machine generally uses electrode pressurizing force or clamping force of several thousands Newtons or more. Since this large force is dangerous, do not put hands, fingers, or any part of the body between the electrodes, and between the clamps. Failure to observe this warning can cause serious injury. The same warning applies to the electrodes when opening. A guard is provided to protect against a pinch point when the upper electrode opens. Do not put hands, fingers or any part of the body between the upper electrode and the cylinder body. Operation should not occur unless the guard is in place.

CAUTION

(2) Wearing safety gear

Spark or spatter that is produced during welding operation may cause eye injury. Since it is difficult to eliminate spark or spatter completely, it is necessary to put on protective glasses, helmet, gloves and non-combustible working clothes to safeguard against splash and spatter.

(3) Prevention from burns or fire

Spark or spatter produced during welding operation or hot parts just after being welded cause burns. Observe the following precautions and install fire extinguishers close to the weld working area in case of an emergency.

(a) Remove flammable substances so that Spark or spatter do not fall on them or drape them with a non-combustible cover.

(b) Do not perform welding work near the flammable gas.

(c) Do not bring hot parts immediately after being welded, close to the flammable materials.

(d) Do not touch the parts just after being welded with bare hands. Even if they are not red, the temperature may be very high, causing a burn.

(e) Keep any personnel other than workers away from a place where spark or spatter is produced.

(4) Noise protection

Measure noise level of this equipment and its surroundings area. If the level is in excess of 85db, use appropriate hearing protection.

1 - 5. Electrical safety

⚠ DANGER

(1) In order to aroid electrical shock

In order to avoid electrical shock, be sure to observe the following items :

(a) Do not touch the parts bearing electrical charges other than secondary conductor. Failure to observe this may result in a fatal electrical shock or severe burns.

(b) Do not touch both ends of secondary conductor simultaneously. Failure to observe this may result in a slight electrical shock.

(2) Connection to the power supply

The equipment should be connected properly to the power supply as per the instruction manual. The power supply work should be carried out according to local laws and your in-house standards.

(3) Qualifications for electrical work

Voltage of approx. 440V is supplied to the equipment according to the specification (Higher voltage may be used depending on models. Refer to the specification).

Educated, trained and qualified personnel[1)] with regard to the potential hazards arising from these dangerous voltages should be assigned, especially, to electrical work for installation, maintenance and repair works.

Note : 1) For example, personnel who possess qualifications for electrical work or authorized customer employee.

(4) Grounding work

An earth terminal is provided with the equipment for safety.

A person qualified for conducting the electrical work should carry out the grounding work according to the local laws and in house standards.

(5) Provision of properly sized conductors

The customer is responsible to provide properly sized conductors for the incoming power feed to the welder. Do not use wire of insufficient capacity or damaged/exposed wires. Failure to observe this may cause fire due to overheated electrical wire and electrical shock or current leakage.

(6) Electric wire connection

The connection terminal of the electrical wire should firmly be tightened and insulated. In case of loose connection, the connection may become overheated and cause fire, and insufficient insulation may cause electrical shock or current leakage.

1 - 6. Safety items on maintenance work

⚠ DANGER

(1) Promotion of safe system start-up and shut-down

There is a possibility of causing extremely dangerous condition when the sources of power supply, pneumatic and water are turned on without warning to a worker during maintenance/repair work. Systems that promote safe system start-up and shutdown should be provided for personnel safety.

(2) Before performing maintenance work

⚠ DANGER

Before performing any maintenance and/or repair work, including cleaning, it must be ensured that :

(a) The equipment has been disconnected, using a lock-out/tag-out procedure, from all power supplies for welding, control and power.

(b) Perform plant lock-out/tag-out procedures on power sources of the equipment.

⚠ CAUTION

(c) All sources of pneumatic pressure and cooling water have been locked-out/tagged-out.

(d) Residual pressure of all pneumatic circuits and cooling water circuits have been relieved.

(3) Perform maintenance work

Installation, maintenance/inspection, repair work should be performed by trained qualified personnel[2)] according to the instruction manual for safety reasons.

Note : 2) Qualified personnel, authorized by the customer, who have received manufacturer's or customer's in-house training and have clear understanding of the equipment in question.

(4) Perform periodic maintenance

It is necessary to perform periodic maintenance and inspection of the equipment as described in the manual.

(5) Water or pneumatic hoses

When the customer prepares to install water, or pneumatic hoses to the welder, make sure they will sufficiently bear the pressure.

Possibilities of danger occur when these hoses have insufficient resistance to pressure or are deteriorated or damaged, periodically perform maintenance and inspection and repair the deteriorated or damaged parts before using the equipment.

(a) When hoses bursts or disconnected, the hose may act violently or the equipment may operate unexpectedly.

(b) When a water hose bursts developing a leak, there is a possibility of deteriorated insulation of the electrical circuit or deterioration of the control equipment and/or current leakage.

1 - 7. Accident prevention

(1) Cooling water used for welding machine

Be sure to observe the following items for safe operation, to prevent accident and maintain proper functioning of the equipment.

(a) Use water of the following quality or equivalent :

① Rate of electric resistance : More than 5,000Ω・cm for thyristor cooling water.

② Less deposit in water.

③ Ammonium ion content must be less than 1ppm.

Smaller resistance of water may cause current leakage. The cooling water with large deposits may clog a circuit to degrade the circuit function, lowering the cooling capacity and causing the circuit to malfunction or fail.

Cooling water containing a large amount of ammonium ions may have the possibilities of corroding copper or copper alloy components on the cooling circuit and create water leaks, leading to current leakage and electrical shock or electrical breakdown of welding transformer that can causes a fire on the equipment.

(b) When the cooling water is turned off, be sure to turn off the welding power supply. Leakage current flowing for a long time may heat and damage thyristors, depending on quality of cooling water.

(c) Amount of cooling water prescribed in the specification of the equipment should be provided in the following manner. It is also important to keep water temperature prescribed in the specification in order to maintain the cooling capacity as well as water quantity :

① Maintain a given water pressure prescribed in the specification.

② Check the water flow periodically to prevent clogging & overheation conditions.

③ Perform maintenance of cooling water circuit as prescribed in the specification.

When cooling capacity is deteriorated, the equipment may generate faults or a fire may generate due to overheated components such as welding transformers, conductors, electrodes, thyristors.

⚠ CAUTION

(2) Upper electrode falls when air supply is stopped

In general, when air supply for welding machine is stopped, the upper electrode falls spontaneously due to deadweight. Though its falling speed is not high, there is a possibility of occurring problems : injury may occur if hands, fingers, a part of body are caught, or work piece be deformed if it is between the electrodes.

(3) Proper pressurizing force must be established

Proper pressurizing force must be established before passing welding current through the electrodes. If current is passed through the electrodes when the pressurizing force is too low, a dangerous explosion of sparks and splatter will occur, causing serious injury or burns.

EXAMPLES:

(a) When pressure of 0.1Mpa or less has been established causing uncontrolled drifting down of the electrode.

(b) When the squeeze time is set too short and the electrode completes the weld circuit under load.

(4) Magnetic field effect

The resistance welding machine generates high magnetic field around the secondary circuit when energized. This magnetic field has an influence on operation of certain type of sensors, watch, and magnetic cards. For the same reason, a person who uses a heart pace maker is prohibited from coming up to the resistance welding machine during operation.

(5) Equipment fall down prevention

Equipment may fall down depending on models when an earthquake occurred. Perform installation work of the equipment according to the instruction manual.

(6) Safety information of peripheral devices

Information about possibilities of danger of peripheral devices of this equipment such as conveyors, feeders, robots should also be provided to workers.

(7) To use within maximum input and allowable duty factor

The welding transformer has rated input, maximum input, allowable duty factor, and so forth. This is the heat capacity of welding transformer prescribed under the cooling conditions (temperature and quantity of water). This specification indicates the upper limit of operation of the welding transformer. In excess of this limit, the welding transformer may be overheated or burnt in some cases. Since the heat capacity of welding transformer is based predicated on being cooled, the welding transformer may be overheated under normal operation or burnt in some cases if the cooling condition is insufficient.

The welding machine and welding transformer should be used within prescribed maximum input and allowable duty factor without fail. (For details, refer to the REFERENCE "Maximum Input of Welding Transformer, allowable duty factor".)

◎ Reference 1 : Maximum input and allowable duty factor of welding transformers

Rated input P_{50}, maximum input P_{max}, allowable duty factor α_{max}, etc. are prescribed for welding transformers.

Rated input P_{50} indicates the input kVA of the welding machine when the duty factor is assumed to be 50%.

The heat capacity of a welding transformer can be indicated with the following formula, using the input and duty factor.

$$\text{Heat capacity} = P_{50} \times (0.5)^{1/2}$$

The heat capacity is constant, regardless of how the transformer is to be used. Since the heat capacity will be the same even when the transformer is used with maximum input P_{max}, it follows that the duty factor will be restricted by a certain value, and this value will be called the "allowable duty factor" α_{max}. That is, they will have the following relationship.

$$P_{50} \times (0.5)^{1/2} = P_{max} \times (\alpha_{max})^{1/2}$$

In other words, the duty factor will have to be reduced when the welding machine or welding transformer is to be used with a large input kVA, and when using it with the duty factor increased, it will exceed the heat capacity of the welding transformer unless the input kVA is lowered. This can easily be examined, if you apply values to above-mentioned formula.

◎ Reference 2: Equivalent continuous current (continuous secondary current) of welding machines

Welding current and duty factor are prescribed for welding transformers. Calculating the following formula with these values will give you the equivalent continuous current (continuous secondary current).

$$I_{2p} = \text{Equivalent continuous current} = \text{Welding current} \times \sqrt{\text{duty factor}} \quad \text{(A)}$$

This is the maximum continuous current that this transformer can allow to flow.

Example 1 : calculation formula of the equivalent continuous current that uses the specification

When the welding current is 11,000 A, and the duty factor is 10% :

$$\text{Equivalent continuous current} = 11{,}000 \times \sqrt{0.1} = 3{,}470 \text{ A}$$

Example 2 : calculation formula of the equivalent continuous current from the welding condition

In the case of applying electrical current three times :

$$I_{2p} = \sqrt{\frac{I_1^{\,2} \times WT_1 + I_2^{\,2} \times WT_2 + I_3^{\,2} \times WT_3}{\text{Production Cycle time (sec.)} \times \text{frequency (Hz)}}} \quad \text{(A)}$$

If a transformer is to be used in excess of this equivalent continuous current, generation of heat by this transformer will cause damages and other accidents.

I_1 : First current to be applied (A)

I_2 : Second current to be applied (A)

I_3 : Third current to be applied (A)

WT_1 : Period of time of the first current to be applied (cycle)

WT_2 : Period of time of the second current to be applied (cycle)

WT_3 : Period of time of the third current to be applied (cycle)

2. Outline

2 - 1. Outline of Weld controls

This device is a control system for a single-phase alternative current spot welder with high performance and high reliability, which uses a microcomputer.

The control device portion (timer unit) built into this device is configured with a constant current control function, voltage compensation control function, step-up function, various monitors and error detection function.

2 - 2. Place of Weld controls

- Type: NWC-900 series

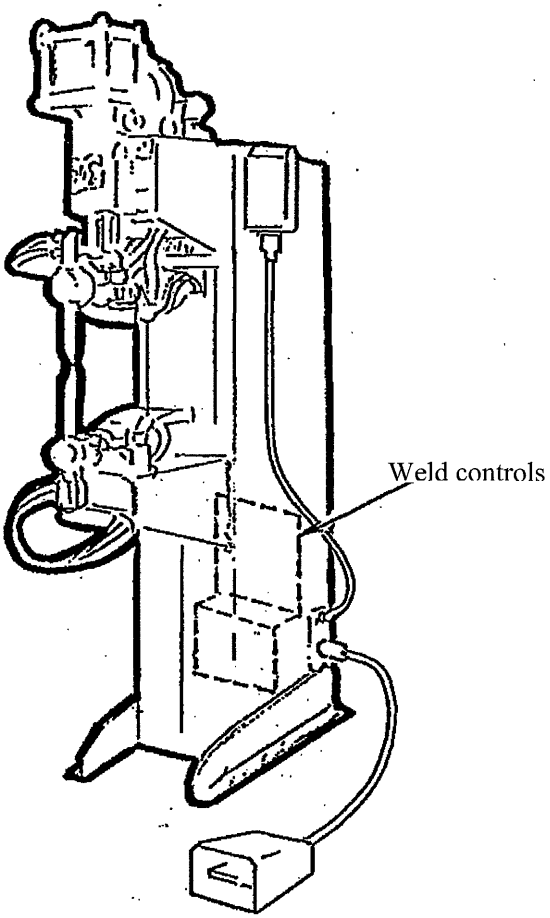


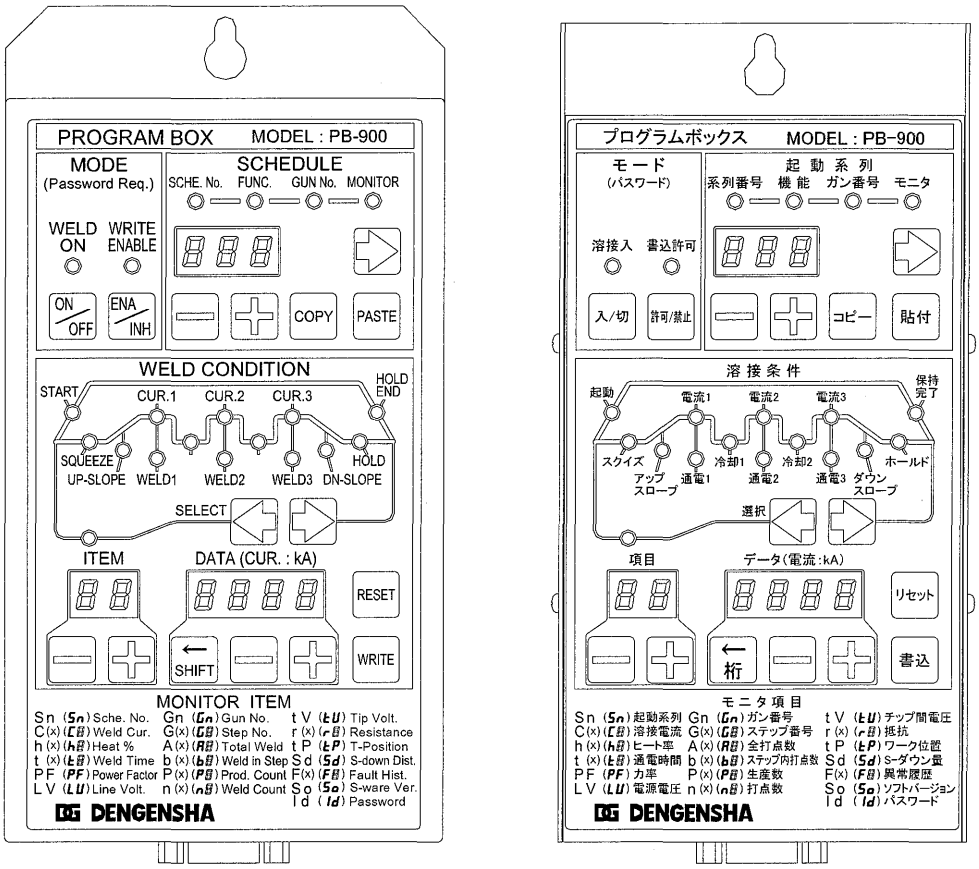
Figure 1 Weld controls

(a) Weld controls is built into the main body.

(b) The settings are performed by the Program box.

2 - 3. Program Box

- Type: PB-900-**



English Japanese

Figure 2 Program box

(a) The Program box is used to set the welding conditions and functions and to display monitor data.

(b) The program box can be used by connecting the cable from the program box to the weld controls of the main body.

- Refer to Program box Instruction Manual for operation.

2 - 4. Program cable

- Type: CB-900-03 (Standard cable length is 3.0m)

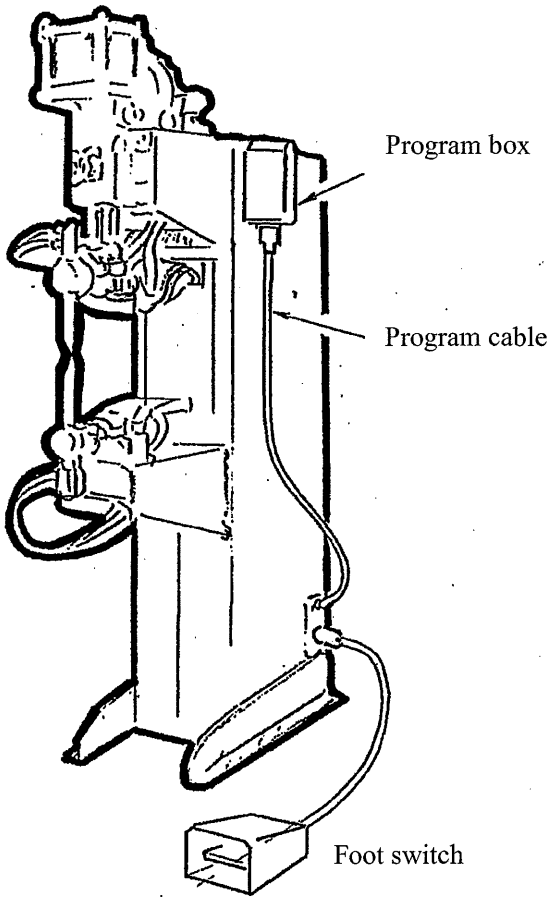


Figure 3 Program cable

3. Specification

3 - 1. Device

(1) Name: Weld controls

(2) Type: NWC-900 series

Model	Destination	Specification		
		Compliance	Voltage	Timer board
NWC-902-11	Japan and Asia	JIS	AC380～415V	GMP-0626B
NWC-902-51	Japan and Asia	JIS	AC440～480V	GMP-0626B
NWC-902-21	North America	Based on UL/CSA	AC440～480V	GMP-0626B
NWC-902-31	Europe	CE Declaration	AC380～480V	GMP-0626B
NWC-902-41	Japan and Asia	JIS	AC200V	GMP-0626B
NWC-903-11	Japan and Asia	JIS	AC380～415V	GMP-0626E
NWC-903-51	Japan and Asia	JIS	AC440～480V	GMP-0626E
NWC-903-21	North America	Based on UL/CSA	AC440～480V	GMP-0626E
NWC-903-31	Europe	CE Declaration	AC380～480V	GMP-0626E
NWC-903-41	Japan and Asia	JIS	AC200V	GMP-0626E

(3) Rated voltage and frequency

Weld power source:	AC200V / AC400V
Control power source:	Internally reduces the welding source for use
Permissible voltage fluctuation:	±20% (Instant)
Frequency:	50/60 [Hz] (Automatic switching)
Power consumption:	45 [VA] (At idle time)

(4) Ambient conditions

Temperature:	5~40 [℃] (however without condensation)
Humidity:	90 [%] or less
Altitude:	Average 1000 [m] or less above sea level.
Storage temperature:	-25 to 55 [℃]

(5) Cooling conditions

(a) Timer board: Natural air-cooling

(b) Thyristor

Cooling water flow rate:	4 [l/min]
Feed water outlet temperature:	30 [℃] or less (No freezing)
Cut-off water pressure:	0.3 [MPa] or less
Electric resistivity:	5,000 [Ω・cm] or more

(6) Thyristor

Size:	Insulation type D size (JIS equivalent)
	Note) Use it below ratings of the equipment.
Maximum primary current:	1,500 [A]

(7) Control method: Synchronous method phase controlby the welding thyristor

(8) Welding current control method

(a) Constant current control:	Loop control by secondary current feedback
Accuracy:	±2% of maximum current
	(for disturbance of ±20%)
(b) Voltage compensation control:	Open loop control by measuring
	the welding source voltage
Accuracy:	±2% of maximum current
	(for welding source voltage fluctuation of ±20%)
(c) HCCL control:	WELD1 : Voltage compensation control
	WELD2 and WELD3 : Constant current control
Accuracy:	Equal to each control

(9) Current detection method

Secondary detection: By toroidal coil

(10) Memory data storage

FRAM method (Batteries not required)

(11) Controllable ranges

Firing angle control range:	25 to 140 [°]
Primary current control range:	50 to 1,500A
	(Limited by the thyristor used and operating ratio)
Secondary current control range:	2.0 to 50.0kA
Welding transformer turns ratio:	1.0 to 200

3 - 2. Functions

(1) Welding schedule

Number of welding schedule: 255 [schedule]

5 / 31 / 255 schedule switching is possible.

The pilot that specifies schedule from the outside is possible up to 31 conditions.

(2) Stepper

Number of steps: 10 [steps]

Number of step spots: Each step 0 - 1,000 [spots]

Step control method: Step up / Linear up

(Increasing rate of first step is fixed at 100%)

(3) Connectable display setting

(a) Program box

Used to set the welding conditions and functions.

Model	Destination	Specification	
		Compliance	IP
PB-900-11	Japan	JIS	-
PB-900-21	North America and Asia	Based on UL/CSA	-
PB-900-22	Europe	CE Declaration	IP54

(b) Monitor box

Used to display monitor data

Model	Destination	Specification	
		Compliance	IP
MB-900-11	Japan	JIS	-
MB-900-21	North America and Asia	Based on UL/CSA	-
MB-900-22	Europe	CE Declaration	IP54

(c) Weld Data Manager

In this system, the welding conditions and environment can be set and its welding-result data can be managed from a personal computer.

(software and transmitter are necessary)

	Model	Corresponding model
Software	Weld Data Manager	All
Transmitter	TSM-900	All

3 - 3. Weld controls

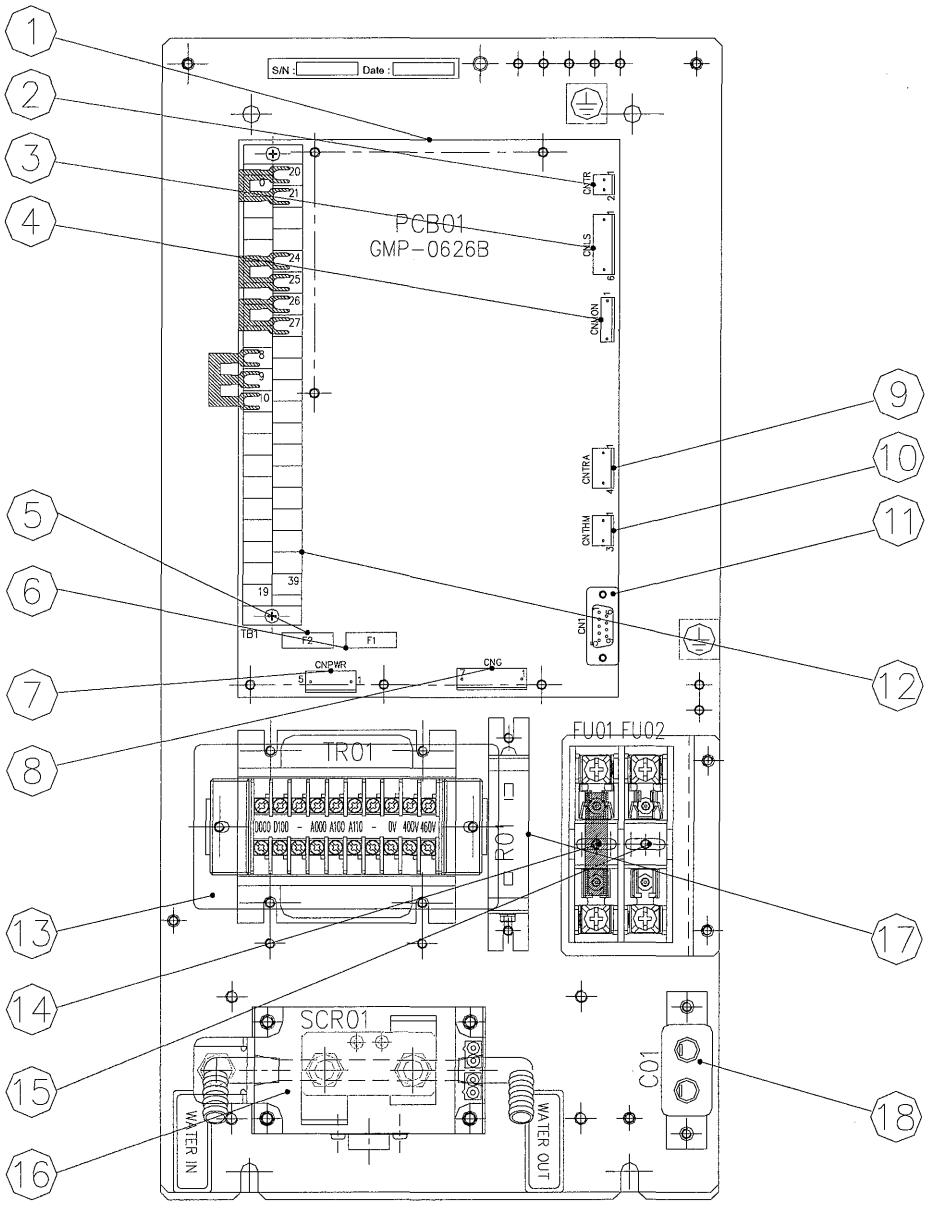


Figure 4 Name of each part of weld controls

① PCB01 Timer board
(GMP-0626B : Standard type, -0626E : Liner encoder type)
② CNTR Connector
③ CNLS Connector
④ CNMON Connector
⑤ F1 Fuse (3A Normal type)
⑥ F2 Fuse (2A Normal type)
⑦ CNPWR Connector
⑧ CNG Connector
⑨ CNTRA Connector
⑩ CNSTHM Connector
⑪ CN1 Connector
⑫ TB1 Connector
⑬ TR01 Control trans.
⑭ FU01 Fuse (1A Time delay type)
⑮ FU02 Fuse (1A Time delay type)
⑯ SCR01 Thyristor
⑰ R01 Resistor
⑱ C01 Condenser

⚠ Danger

Please work after confirming the welding source is doing "OFF" when you do the maintenance check.

Mandatory item

There is fear of the breakdown of the malfunction and the device and destruction when the pulling out opening and the board of the connector are detached with the power supply entered. Please confirm the power supply is intercepted.

3 - 4. Jumper, DIP SW on Timer board

There are some switches and jumpers mounted on the Timer board to select functions.

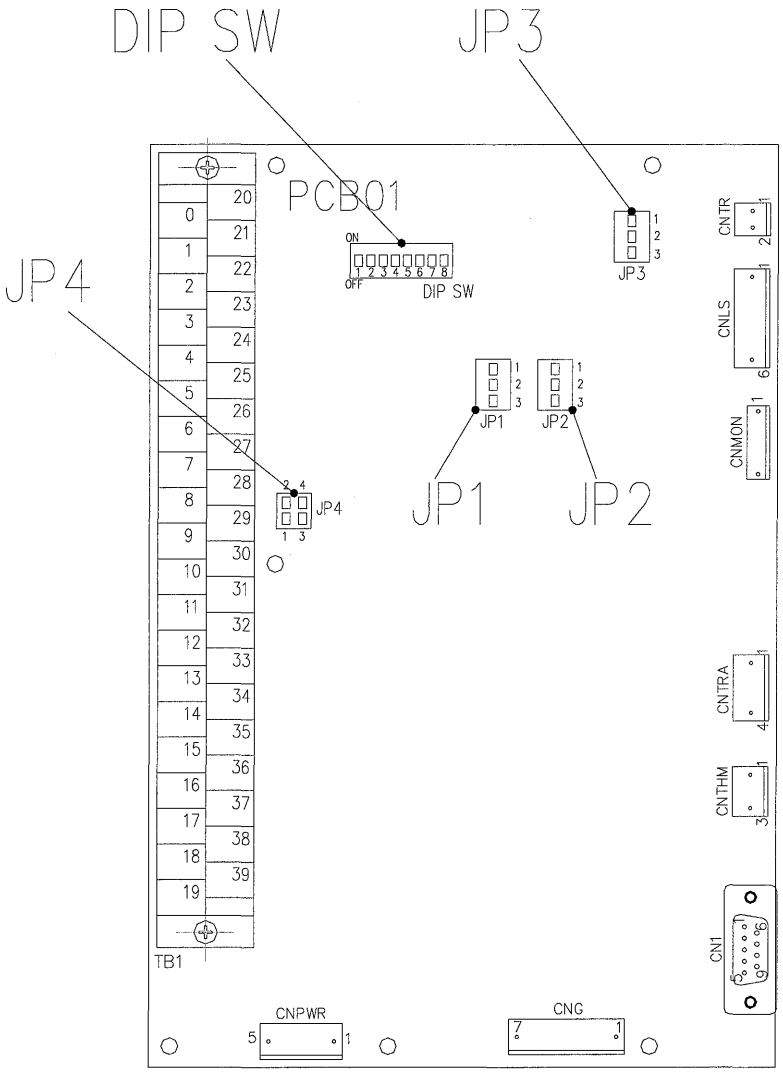


Figure 5 Jumper, DIP SW on Timer board

Mandatory item
Do not rewrite CPU software for the welding control of the timer Board. A correct welding control cannot be done. And, the pressurizing operation is done regardless, and there is danger of placing the finger with equipment worker's intention.

(1) DIP SW

This 8 bit switch is for selecting the functions.

Bit No.	"ON" side	"OFF" side	
1			※
2			
3			
4			
5			※ Encoder option.
6			
7			
8			

: Factory setting of standard model

※: It has set it according to the specification. Please do not change.

Mandatory item

When shipping it, DIP-SW on the board is set according to the specification. The current control cannot be correctly done when carelessly moving it. In addition, the equipment breakdown and destruction might be caused. Please do not change.

(2). Jumper

- JP1 : Constant 2-3 short
- JP2 : Constant 2-3 short
- JP3 : Constant 1-2 short
- JP4 : Input common switch (At shipment 1-3,2-4short:Minus common)

Mandatory item

When shipping it, Jumper on the board is set according to the specification. The current control cannot be correctly done when carelessly moving it. In addition, the equipment breakdown and destruction might be caused. Please do not change.

3 - 5. Timer Board Input/Output Signal

(1) Electric specifications

- Input open circuit voltage DC 24 V, Input short circuit current 10 mA
- Photo MOS relay output (all A contact)

  Maximum load voltage: DC24V

  Maximum load current: 0.12A
- Pressure valve output capacitance: DC24V,0.12A
- (direct drive of the direct-acting valve is not possible)

Note) DC24V power supply is not stabilized. The total maximum load current is 0.5A.

Note) A buzzer is output when the counter function is executed.

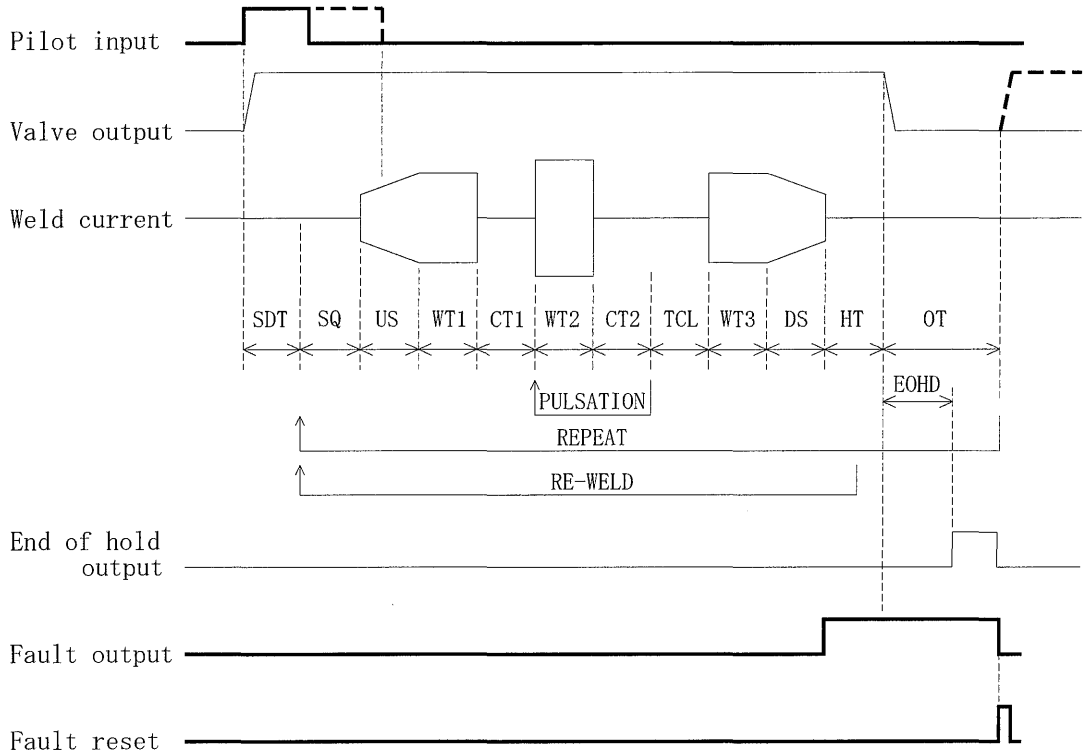
(2) Signal names, operations and functions

I/O	Signal names	Operation and function		Connect
Input	Input common	Input common		TB1-0
	Pilot common	Pilot common		TB1-20
	Pilot 1 (1)	When it is "ON", it is selected in the 1st welding schedule.	When a 31 SCHE. is used, it becomes a 5 bit binary code input	TB1-21
	Pilot 2 (2)	When it is "ON", it is selected in the 2nd welding schedule.		TB1-1
	Pilot 4 (3)	When it is "ON", it is selected in the 4th welding schedule.		TB1-22
	Pilot 8 (4)	When it is "ON", it is selected in the 8th welding schedule.		TB1-2
	Pilot 16 (5)	When it is "ON", it is selected in the 16th welding schedule.		TB1-23
Input	Timer stop	It usually operates in the state of "ON". Welding sequence is interrupted, and gun is opened when entering the state of "OFF".		TB1-24, TB1-25
	Fault reset	Faults are cleared when turned "ON".		TB1-4
	Weld / No weld	When started in the "ON" state, normal welding is executed. When started in the "OFF" state, the welding sequence is executed without weld.		TB1-26
	Stepper rest	All the stepper counters are initialized by "ON".		TB1-6
	Counter reset	The count value of product count and weld count is cleared by "ON".		TB1-7
	Interlock	In the state of "ON", it enters the state of the energizing standby.		TB1-28
	Press test	The pressurizing operation is done when starting in the state of "ON". However, the welding sequence is not executed.		TB1-29
	Flow switch	Cooling water flow switch is connected		TB1-9
	Pressure switch	Pressure switch is connected		TB1-10
	Input common	Input common		TB1-3, 8,27,30
Input	Trans thermo	Thermostat signal from the welding transformer is connected.		CNTRA-1 CNTRA-3
	SCR thermo	Thermostat signal of the thyristor cooling fin is connected.		CNTHM-1 CNTHM-3

I/O	Signal names		Operation and function	Connect
Output	End of hold	HOLD	Turns ON when the sequence is completed, and turns OFF when the pilot input is turned OFF. When pilot is turned OFF midway or pulse pilot is executed, the signal is output for at least 100ms.	TB1-12
		50,200ms	Regardless of pilot input status, it turns ON upon completion of sequence for designated duration. (50, 200ms)	
	Fault		Turns ON when alarm goes off.	TB1-31
	Interlock output		Turns ON during current application (after the squeeze has been completed– immediately before hold)	TB1-13
	Step completion		Turns ON upon completion of stepper.	TB1-32
	Product count completion		Turns ON when the product count reaches the set product count.	TB1-34
	Timer ready		"OFF" It does abnormally. Timer ready is turned OFF by doing either of Flow switch or pressure switch in "OFF".	TB1-35
	Output common		Output common	TB1-11,33,14
Output	Valve		Output for Valve.	TB1-36
	Buzzer		Output for buzzer.	TB1-37
	DC power (N24)			TB1-15
	Valve / Buzzer common		Valve / Buzzer common. (+DC24)	TB1-16

4. Operation

4 - 1. Basic operational sequences



SDT : Squeeze delay
SQ : Squeeze
US : Up Slop
WT1 : Weld time 1
CT1 : Cool time 1
WT2 : Weld time 2
CT2 : Cool time 2
TCL : Temper cool
WT3 : Weld time 3
DS : Down Slope
HT : Hold time
OT : Off time
EOHD : End of hold delay

PULSATION : Only the set number repeats the WT2 and the CT2.
REPEAT : Range to which it is repeated that repet operates.
※ Repet operation becomes OFF by setting the Off time to "0".
RE-WELD : Range of repetition of RE-WELD operation
※ When RE-WELD, the wait time of 50 cycles is inserted.

Figure 6 Weld sequence

5. Programming

5 - 1. Flow of Programming (Setting of Functions and Welding Conditions)

- The programming is performed in the program box.
- Programming can be performed at all times. When using this unit for the first time or the unit has not been used for a long period, confirm the setting contents first, and reconfirm that the correct values are set.

5 - 2. Program Contents

(1). Setting Function (F schedule)

① Maximum schedule :5 / 31 / PNL Address: 1

[5 SCHE. / 31 SCHE. / Panel 255 SCHE.]

- 5 SCHE. ・・・Pilot input will be individually for Pilot 1 - 5.
- 31 SCHE. ・・・Input will be a 5 bit binary using start 1 - 5.(Start 1 is LSB)
- PNL ・・・Pilot schedule is selected in the program box. (255 SCHE.)

② Self hold:OFF / WELD / PULS Address: 3

[Self hold OFF / Weld time self hold / Pulse pilot]

- Self hold OFF

  ・・・The sequence is not completed unlesspilot signal is input to the end (end of hold signal is output). When the pilot signal is turned OFF midway, the sequence will stop immediately.

- Weld time self hold

  ・・・Even though the pilot signal is turned OFF, the welding sequence will be executed to the end, once the weld is started (up slope or later).

- Pulse pilot

  ・・・The pulse signal can be used for a pilot input.A pulse width of 40ms or more is required.

③ End of hold:50 / 200 / HOLD Address: 4

[50msec / 200msec / HOLD]

Select the output time of the end of hold signal (contact output).

- 50msec, 200msec ・・・Signal is output for a specified time.
- HOLD ・・・Signal output is held until start is turned OFF. However, the signal is output for at least 100msec even when start is turned OFF midway.

④ Reweld: OFF / ON Address: 5

[OFF / Reweld]

When an alarm occurs such as a excessively low current, the status returns to squeeze and the welding is executed again without outputting an error or releasing the gun. As a result, the sequence will be completed if there is no error. An error will be output if an error occurs again. Retry can be performed 1 time.

When performing a re-weld, a wait of about 50 cycles is inserted instead of a hold time.

Alarms

- Weld current low
- Heat % high
- Weld time short
- No current

⑤ Fault reset by start input: OFF / ON Address: 6

[OFF / Fault reset by start input]

After an alarm is detected, reset start is executed by the start input, not by the alarm reset input. However, this function will not be activated for serious alarm, such as a memory error, thermo alarm, SCR shorted and etc. Reset the error by the program box, or the external error reset input signal.

Alarms

- Normal alarm
- Notification warning (stepper completed, etc.)

⑥ Select buzzer mode:0 / 1 / 2 Address: 7

- 0 ・・・Buzzer ON when an error occurs, or weld completed in work
- 1 ・・・Buzzer ON when an error occurs
- 2 ・・・Buzzer ON when weld completed in work

⑦ Stepper: OFF / STEP / LINR Address: 8

[OFF / Step up / Liner up]

Select the stepper function.

⑧ Interlock mode:0 / 1 Address: 9

- 0 ・・・Interlock selection between 2 systems
  Waits until the interlock input is turned OFF by pilot input, and when the interlock is turned OFF, the interlock output is turned ON and the weld is started.
- 1 ・・・Interlock selection with multiple systems
  The interlock output turns ON by pilot input, and waits until the interlock input is turned OFF, and when the interlock is turned OFF, the weld is started.
  (Interlock control panel required)

⑨ Select toroidal type: STD / ISO Address: 10

- STD・・・DG standard toroidal (230 mV/1,000 A)
- ISO・・・ISO toroidal (150m V/1000 A)

(Only DSW-5 "ON")

⑩ Nut detection: OFF / ON Address: 20

A linear encoder is used to measure the work height under pressure, and defective items and substances are detected.

(Only DSW-5 "ON")

⑪ Electrode position compensation: OFF / ON Address: 21

While adjusting the amount of electrode wear using a linear encoder, defective items and foreign substances are detected.

(Only DSW-5 "ON")

⑫ Setdown: OFF / ON Address: 22

A linear encoder is used to measure the amount of weld penetration, from the electrode position before and after weld.

(2). Setting Common (0) schedule

① Squeeze delay: 0 - 50 [Cycle] Address: 1

The delay time can be set for the period after pilot signal is accepted until the welding sequence is started.

② End of hold delay: 0 - 50 [Cycle] Address: 2

The delay time can be set for the period after the welding sequence is completed until the end of hold signal is output.

③ Weld time compensation: 0 - 50 [Cycle] Address: 3

The lack of weld time is compensated for but is limited to the compensation value.
For example, when the value was set to '3rd Cycle', even though there was a lack in the 4th Cycle and later, only the value in the 3rd Cycle is compensated for.

④ Insufficient weld time: 0 - 50 [Cycle] Address: 4

An error is output when the detected weld time was less than the set weld time. This is the allowed value.

⑤ Over time: 10 - 2000 [Cycle] Address: 5

An error is output when the set weld time was longer than the set over time. This is the allowed value.

⑥ Line volt: 100 - 1000 [V] Address: 6

Input the voltage of the weld power source. If the value is not set correctly, the value on the voltage monitor will not be displayed correctly. However, there is no effect on welding control at all.

⑦ Line volt high limit: 5 - 50 [%] Address: 7

Set the detection level for the abnormal increase in the weld power voltage.

⑧ Line volt low limit: 5 - 50 [%] Address: 8

Set the detection level for the abnormal decrease in the weld power voltage.

⑨ Password (weld off): 0 - 9999 Address: 30

Set the password to turn off the weld.

⑩ Password (write enable): 0 - 9999 Address: 31

Set the password to write the data.

(3). Setting GUN No. (G) schedule

① Global maximum current: 2.0 - 60.0 [kA] Address: 1

The maximum current setting of each weld schedule can be omitted (OFF) by setting the data.

Note) The weld schedule is given to priority when the maximum current is set with the weld schedule.

② Global current control mode: CC / VC / HCCL Address: 2

The current control select of each weld schedule can be omitted (OFF) by setting the data.

- CC: From the weld1 to weld3 is a constant current control.
- VC: From the weld1 to weld3 is a voltage compensation control.
- HCCL: The weld1 controls the heat control current limit.
  Weld2 and weld3 is a constant current

Note) The weld schedule is given to priority when the current control mode is set with the weld schedule.

③ 2 point calibration: OFF / ON Address: 4

The test weld is performed in advance for each point near the upper limit and lower limit of the current to be actually used, and the values are adjusted based on the results to improve the current accuracy of the constant current control.

Set the current set values and measured values as in the following (4) - (7).

④ Calibration base1: 2.00 - 50.00 [kA] Address: 5

Set the current setting value for the high limit from the weld test that was performed in advance for the 2 point calibration.

⑤ Calibration base2: 2.00 - 50.00 [kA] Address: 6

Set the current setting value for the low limit from the weld test which was performed in advance for the 2 point calibration.

⑥ Calibration current1: 2.00 - 50.00 [kA] Address: 7

Set the current measurement value for the high limit from the weld test which was performed in advance.

⑦ Calibration current: 2.00 - 50.00 [kA] Address: 8

Set the current measurement value for the low limit from the weld test which was performed in advance.

⑧ Weld count: 0 - 9999 Address: 9

Set the number of welds per work piece.

When the actual number of welding spots reaches the set value, the production counter starts to count. (The number of spots can not be counted if the weld is OFF, or a trouble occurs.)

⑨ Product count: 0 - 9999 Address: 10

Set the production number. When the production counter reaches the set value, a buzzer is output to notify the worker.

⑩ Global original position: 0 / 1.0 - 200.0 [mm] Address: 14

Set the original pressure position of the electrode, to detect a defective item with the linear encoder.

- When referring to the condition with a work piece, set the distance in which the thickness of the work piece is deducted from the stroke amount of the maximum open position to the pressure position.
- When referring to the condition without a work piece, set the stroke amount of the maximum open position to the pressure position.

Note) The weld schedule is given to priority when the original position is set with the weld schedule.

⑪ Nut detection at "Weld OFF" : OFF / ON Address : 15

The height of the pressurizing work is measured in the state of Weld OFF with a linear encoder. Confirming the operation of the stock out detection and the foreign body detection can be done with weld off.

⑫ Step count

The number of ten steps of each step runs batted in is set (Each weld schedule sets the increase).

- Step0 count: 0 - 1000 [count] Address: 20
- Step1 count: 0 - 1000 [count] Address: 21
- Stes2 count: 0 - 1000 [count] Address: 22
- Step3 count: 0 - 1000 [count] Address: 23
- Step4 count: 0 - 1000 [count] Address: 24
- Step5 count: 0 - 1000 [count] Address: 25
- Step6 count: 0 - 1000 [count] Address: 26
- Step7 count: 0 - 1000 [count] Address: 27
- Step8 count: 0 - 1000 [count] Address: 28
- Step9 count: 0 - 1000 [count] Address: 29

(4). Setting Weld (W) schedule (SCHE.No.1～255)

①	Squeeze:	0 - 100 [Cycle]	Address: 1
②	Up slope:	0 - 100 [Cycle]	Address: 2
③	Weld1:	0 - 100 [Cycle]	Address: 3
④	Current1:	2.0 - 50.0 [kA]	Address: 4
		15 - 100 [%](VC mode)	
⑤	Cool1:	0 - 100 [Cycle]	Address: 5
⑥	Weld2:	0 - 100 [Cycle]	Address: 6
⑦	Current2:	2.0 - 50.0 [kA]	Address: 7
		15 - 100 [%] (VC mode)	
⑧	Cool2:	0 - 100 [Cycle]	Address: 8
⑨	Weld3:	0 - 100 [Cycle]	Address: 9
⑩	Current3:	2.0 - 50.0 [kA]	Address: 10
		15 - 100 [%] (VC mode)	
⑪	Down slope:	0 - 50 [Cycle]	Address: 11

It becomes a demagnetization function because of the setting of 31Cycle or more.

⑫	Hold:	1 - 100 [Cycle]	Address: 12
⑬	Off:	0 - 100 [Cycle]	Address: 13

Mandatory item

Please give the setting of Off to me as "0" when the worker welds. The repetition hangs in the automatic operation when the start maintains turning on, except when a set value is 0. And, there is danger such as scissors of the finger. Please make the setting "0" when the worker welds.

⑭	Pulsation:	1 - 20 [times]	Address: 14

⑮ Initial current heat%: OFF / 15 - 80 [%] Address: 15

The current heat% of the 0.5 cycle that starts to weld can be freely set. It weld for "OFF" at the current heat% calculated from the maximum current.

The initial current heat % is a function that the current heat % from the weld beginning (The up slope is contained) to 0.5cycle can be arbitrarily set.

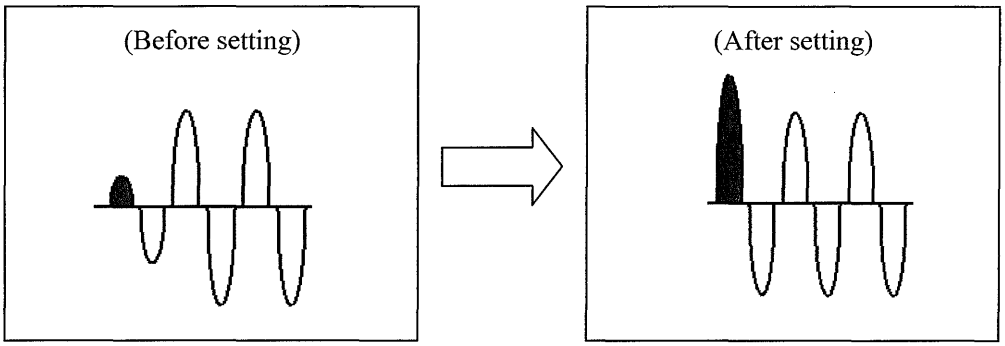


Figure 7 Initial current heat%

●Usage

When the projection is welded, this function is used.

●Preparation

2) Test weld

Work is welded by an appropriate welded condition.

3) Confirmation

Heat % 1 is confirmed by monitoring Program box.

●Weld

4) Setting

Confirmed heat % 1 is set to the initial current heat %.

5) Weld

⑯ Maximum current: OFF / 2.0 - 60.0 [kA] Address: 16

The maximum current value of the welding machine is set. The current value when firing because of a full wave is input. Please set a correct value that corresponds to the ability of the welding machine.

⑰ Current control mode: OFF / CC / VC / HCCL Address: 17

The current control method is selected.

⑱ Current1 high limit: 3 - 50 [%] Address: 19

The disregard level of a high abnormal current is set.

An increase to the set current value is set with %.

⑲ Current1 low limit: 3 - 50 [%] Address: 20

The disregard level of low abnormal current is set.

An increase to the set current value is set with %.

⑳ Current2 high limit: 3 - 50 [%] Address: 21

The disregard level of a high abnormal current is set.

An increase to the set current value is set with %.

㉑ Current2 low limit: 3 - 50 [%] Address: 22

The disregard level of low abnormal current is set.

An increase to the set current value is set with %.

㉒ Current3 high limit: 3 - 50 [%] Address: 23

The disregard level of a high abnormal current is set.

An increase to the set current value is set with %.

㉒ Current3 low limit: 3 - 50 [%] Address: 24

The disregard level of low abnormal current is set.

An increase to the set current value is set with %.

㉓ Heat high limit: 20 - 200 [%] Address: 25

The disregard level of heat high abnormal % is set.

㉔ Heat low limit: 10 - 100 [%] Address: 26

The disregard level of heat low abnormal % is set.

㉕ HCCL mode current limit: 2.0 - 50.0 [kA] Address: 28

The current limit value of the HCCL control mode is set.

(The weld1 controls with the current limit the heat control.)

㉖ Stepper increase

The increasing rate of each step is set. The current value of each step is input with % based on the set current value.

When 100% is input, the current value of the step reaches the same current value as a set value. The value is input from 1 to 9 steps. Increasing rate 0 is 100% fixation.

- Increase1: 50 - 200 [%] Address: 41
- Increase2: 50 - 200 [%] Address: 42
- Increase3: 50 - 200 [%] Address: 43
- Increase4: 50 - 200 [%] Address: 44
- Increase5: 50 - 200 [%] Address: 45
- Increase6: 50 - 200 [%] Address: 46
- Increase7: 50 - 200 [%] Address: 47
- Increase8: 50 - 200 [%] Address: 48
- Increase9: 50 - 200 [%] Address: 49

㉗ Temper cool: 0 - 1000 [Cycle] Address: 50

The cool time added for cool2 and weld3 is set.

㉘ Original position: OFF / 1.0 - 200.0 [mm] Address 56

When it detects the foreign body, and the no Nut is detected with a linear encoder, the distance from the position of the gun maximum open to the pressurizing position (There is an work or is no work) is set.

㉙ Nut high limit: 0.1 - 20.0 [mm] Address: 57

When the foreign body is detected with a linear encoder, the distance of a pressurizing position and an original position in which the foreign body detection is judged is set.

㉚ Nut low limit: -9.9 - 0.1 , 0.1 - 20.0 [mm] Address: 58

When the no Nut is detected with a linear encoder, the distance of a pressurizing position and an original position in which the no Nut detection is judged is set.

The direction of the gun opening sets the positive value from a standard position and the direction of pressurizing sets a minus value.

㉛ Setdown high limit: 0.00 - 20.00 [mm] Address: 59

The distance at the gun position before and after the welding of the projection welding etc. is set with a linear encoder and when the quality is judged, the distance in which the setdown high limit is detected is set. It is abnormally judged that the distance at the gun position before and after the welding becomes more than a set value.

㉜ Setdown low limit: 0.00 - 10.00 [mm] Address: 60

The distance at the gun position before and after the welding of the projection welding etc. is set with a linear encoder and when the quality is judged, the distance in which the setdown low limit is detected is set. It is abnormally judged that the distance at the gun position before and after the welding becomes below a set value.

◎Attention in program

Data that exceeds the data range cannot be set.

NWC-900 Program sheet (1/2)

DATE: NAME:

FUNCTION (F) SCHEDULE

ITEM	Maximum schedule	Self hold	End of hold	Reweld	Fault reset by start input	Select buzzer mode	Stepper	Interlock mode	※1 Select toroidal type	※2 Nut detection	※2 Electrode position compensation	※2 セットダウン
ADDRESS	1	3							10	20	21	22
SETTING RANGE	5/31/PNL	OFF/WELD/PULS	50/20						STD/ISO	OFF/ON	OFF/ON	OFF/ON
INITIAL SETTING	31	WELD	H						STD	OFF	OFF	OFF
0	☐5 SCHE.	☐Self hold OFF	☐50 mse					2 systems	☐DG standard	☐OFF	☐OFF	☐OFF
1	☐31 SCHE.	☐Weld time self hold	☐200 msec.	☐Reweld	☐Reset	☐Fault	☐Step up	☐Multi	☐ISO	☐ON	☐ON	☐ON
2	☐255 SCHE. (Panel)	☐Pulse start	☐Hold			☐Comp.	☐Liner up					

Function (F) schedule

COMMON (C) SCHEDULE

ITEM	Squeeze delay	End of hold	Weld time compensation	Insuffoient weld time	Over time	Line volt	Line volt high limit	Line volt low limit	Password (weld off)	Password (writwe enable)
ADDRESS	1	2	3	4	5	6	7	8	30	31
SETTING RANGE	0 – 50								0 – 9999	0 – 9999
Unit	Cycle								–	–
INITIAL SETTING	0								0	0
Sett value										

Common (0) schedule

GUN No.
(G) SCHEDULE ※3 ※4

ITEM	Global maximum current	Global current control mode	2points calibration	Calibration base 1	Calibration base 2	Calibration current 1	Calibration current 2	Weld count	Product count	※2 Global original position
ADDRESS	1								10	14
SETTING RANGE	2.0 –								0 – 9999	0/1.0 – 200.0
Unit	k/								–	mm
INITIAL SETTING	60								0	0
Sett value										

GUN No. (G) schedule

※1;Only setting.This welder doesn't correspond to the ISO toroidal coil.
※2;Only as for the linear encoder specification, the display and the setting become possible.
※3;When shipping it, the setting matched to a fixed welder is done. (Muximum road current rating + 20%)
※4;CC;Constant current, VC;Voltage compensation, HCCL;Heat control curretn limit
※5;Only HCCL mode
※6;It becomes a demagnetization function because of the setting of 31Cycle or more.

☐1:2009/3
☐N:2009/2
DRW#:U990-40-3985-1

Figure 8 Outline of program sheet 1

NWC-900 Program sheet (2/2)

DATE: NAME:

WELD (W) SCHEDULE (SCHE. No. 1~255) ※6

ITEM	Squeeze	Up slope	Weld 1	Current 1 GC	Current 1 VC	Cool 1	Weld 2	Current 2 GC	Current 2 VC	Cool 2	Weld 3	Current 3 GC	Current 3 VC	Down slope	Hold	Off	Pulsation
ADDRESS	1	2	3	4		5	6	7		8	9	10		11	12	13	14
SETTING RANGE	0 – 100	0 – 100	0 – 100	2.0 – 50.0	15 – 100	0 – 100	0 – 100	2.0 – 50.0	15 – 100	0 – 100	0 – 100	2.0 – 50.0	15 – 100	0 – 50	1 – 100	0 – 100	1 – 20
Unit	Cycle	Cycle	Cycle											Cycle	Cycle	Cycle	◻
INITIAL SETTING	50	0	0											0	1	0	1
SCHE.																	

Weld (W) schedule

WELD (W) SCHEDULE (SCHE. No. 1~255) ※4 ※5 ※2 ※2 ※2 ※2 ※2

ITEM	Initial current heat%	Maximum current	Current control mode	Current 1 high limit	Current 1 low limit	Current 2 high limit	Current 1 low limit	Current 2 high limit	Current 1 low limit	Heat high limit	Heat low limit	HCCL mode current limit	Temper cool	Original position	Nut high limit	Nut low limit	Setdown high limit	Setdown low limit
ADDRESS	15	16	17	19	20	21	22	23	24	25	26	28	50	56	57	58	59	60
SETTING RANGE	OFF/ 15 – 80	OFF/ 2.0 – 60.0	OFF/CC /VC/HCCL	3									0 – 500	OFF/ 1.0 – 200.0	0.1 – 20.0	-9.9 – -0.1 0.1 – 20.0	0.00 – 20.00	0.00 – 10.00
Unit	%	kA	–										Cycle	Cycle	mm	mm	mm	mm
INITIAL SETTING	OFF	OFF	OFF										0	OFF	20.0	1.0	20.00	10.00
SCHE.																		

Weld (W) schedule

STEPPER

ITEM	Increase [%] (WELD (W) SCHEDULE (SCHE. No. 1~255))		Weld count [Count] (GUN No. (G) SCHEDULE)									
ADDRESS	41	42	23	24	25	26	27	28				
SETTING RANGE			0 – 1000									
INITIAL SETTING			0									
Step	1	2	4	5	6	7	8	9				
GUN No. 1												

Stepper

※1;Only setting.This welder doesn't correspond to the ISO toroidal coil.
※2;Only as for the linear encoder specification, the display and the setting become possible.
※3;When shipping it, the setting matched to a fixed welder is done. (Muximum road current rating + 20%)
※4;CC;Constant current, VC;Voltage compensation, HCCL;Heat control curretn limit
※5;Only HCCL mode
※6;It becomes a demagnetization function because of the setting of 31Cycle or more.

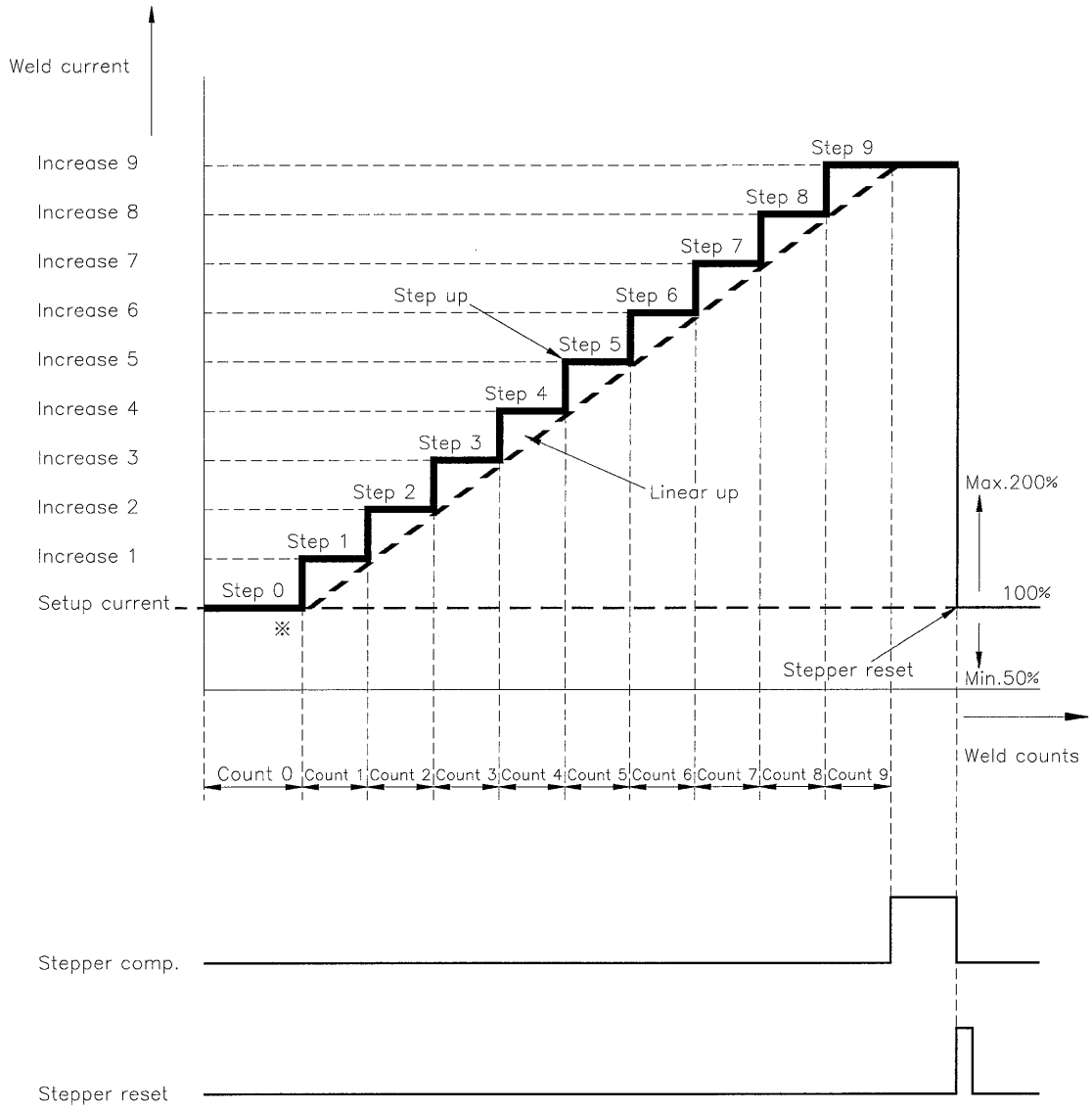
◻1:2009/3
◻N:2009/2
DRW#:U990-40-3985-2

Figure 9 Outline of program sheet 2

6. Special functions

6 - 1. Stepper function

- This is a function that gradually increases current corresponding to weld count.
- When weld count increases deformation and expansion of welding tip occurs. This causes weakening of welding strength. Linear / step-up function prevents weakening of welding strength.
- With step-up increase is made step by step and with linear-up change is made linearly towards set ratio of increase as its target value.



※ With linear-up increase is not made during 1st region.

※ Ratio of increase 100% = set current, at step 0.

Figure 10 Stepper sequsence

- Stepper setting items
  - (1) Ratio of increase (step 1 - 9) 50 - 200 (%) (step 0 is fixed at 100%)
  - (2) Weld count (each step) 0 - 1000
- The stepper schedule are two affiliates, and each of ten steps.
- Setting unit of weld count is 1 spot. If "100" is input then step-up is performed after the 100th weld count is made.
- The rate of increase functions independently in each weld schedule.
- Set units of the number of runs batted in are one runs batted in. The step improves when the 100th runs batted in end when inputting as "100".
- Setting value of weld count is for each step, and not total weld count. Step is complete with maximum of 999 weld count.

Step No.	Stepper	
	Weld count [count]	Increase [%]
0	0～1000	100
1	0～1000	50～200
2	0～1000	50～200
3	0～1000	50～200
4	0～1000	50～200
5	0～1000	50～200
6	0～1000	50～200
7	0～1000	50～200
8	0～1000	50～200
9	0～1000	50～200

7. Current control mode

The current control mode consists of a constant current control and voltage compensation control. Select a control mode suitable for the operating conditions.

7 - 1. Current control

The current feedback is measured for each half cycle, and based on this data the firing angle is calculated to send a current closer to the specified current value in the next cycle. Therefore, it responds at a high speed when a fluctuation occurs in the power supply voltage or the load.

(1) Current setting mode: The current value is set directly.
Minimum unit: 100 (A)
Allowable setting range : 2,000 ～ 50,000 (A)

(2) Factors for compensation: Fluctuation in power supply voltage and load

7 - 2. Voltage compensation control

When multiple guns are weld simultaneously, select the voltage compensation.

(1) Current setting mode: Current setting method: Set the full wave current at the rated voltage to 100%.
Allowable setting range: 15 to 100%

(2) Factor for compensation: Fluctuation of the power supply voltage only

7 - 3. HCCL Control (Heat Control Current Limit)

Please select HCCL when you remove the garbage etc. that attach to work by the first weld.
Weld secondarily and thirdly controls a constant current.

(1) Method of setting current : Individual welding schedule

Weld 1 (Heat %[%]),
Weld2, 3 (Current Value [kA])
HCCL mode current limit is set.

(2) Factors for compensation: Fluctuation in power supply voltage and load

Note) In the first weld HCCL, the current might flow up to the HC limit current regardless of set value kA.

●Preparation

1) Test weld
The current control method is set to CC, and work is weld by an appropriate welded condition.

2) Confirmation
Heat % 1 is confirmed by monitoring Program box.

●Weld

3) Setting
① The current control method is changed from CC to HCCL.
② Heat % 1 confirmed to one in the current by 2) is set.
③ The current in which one in the current is set to the HC limit current by 1) is set.

4) Weld

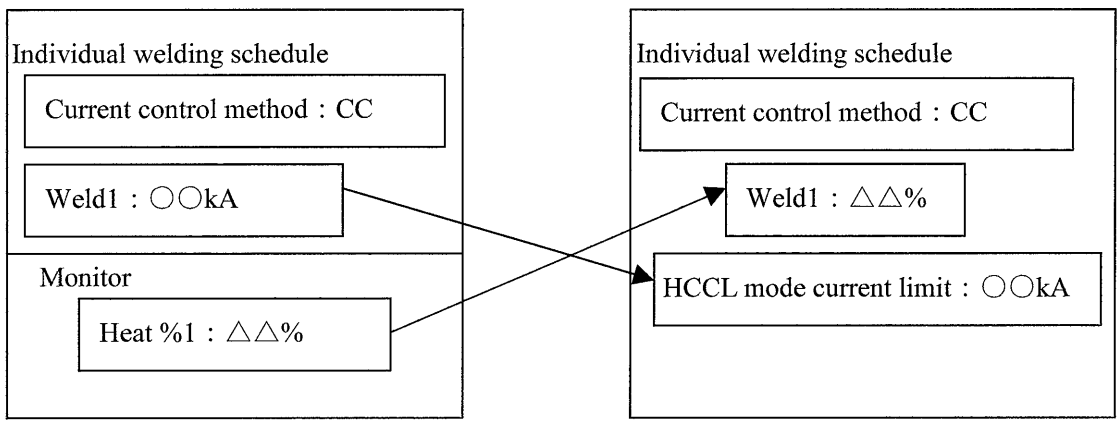


Figure 11 Setting method of HCCL

7 - 4. Setting

The settings for the current control are the 'constant current control' selected in 'CC', 'voltage compensation control' in 'VC', 'HCCL control' in 'HCCL', and 'Global current control mode' in 'OFF'.

8. Monitor function

- The function in this system monitors the results of the welding in the program box.

8 - 1. Monitoring functions by the program box

Items	Monitor	Content
Sn	Sn	Schedule No.
C1	C1	Weld current1
C2	C2	Weld current2
C3	C3	Weld current3
h1	h1	Heat% 1
h2	h2	Heat% 2
h3	h3	Heat% 3
t1	t1	Weld1 time
t2	t2	Weld2 time
t3	t3	Weld3 time
tA	tA	Total weld time
PF	PF	Power factor
LV	LU	Line volt
Gn	Gn	Gun No.
G1	G1	Step No
A1	A1	Total weld count
b1	b1	Weld in step
P1	P1	Product count
n1	n1	Weld count
tP	tP	Touch position
Sd	Sd	Setdown distance
F1	F1	Fault history 1
F2	F2	Fault history 2
F3	F3	Fault history 3
F4	F4	Fault history 4
F5	F5	Fault history 5
F6	F6	Fault history 6
F7	F7	Fault history 7
F8	F8	Fault history 8
F9	F9	Fault history 9
So	So	Software version
Id	Id	Password

9. Fault code

9 - 1. Fault code List

Group	Code	English	type	Fault output	Remarks
Stepper Counter	F011	Gun1 step complete	Warning	Step completion	
	F021	Gun1 product count complete	Warning	Product count comp.	
Weld current	F101	Weld current1 low	Error	○	
	F102	Weld current2 low	Error	○	
	F103	Weld current3 low	Error	○	
	F151	Weld current1 high	Error	○	
	F152	Weld current2 high	Error	○	
	F153	Weld current3 high	Error	○	
Heat% low/high	F200	Heat% low	Error	○	
	F250	Heat% high	Error	○	
Wrong parameter	F300	Memory error of function parameter	Major Error	○※	
	F301	Memory error of common parameter	Major Error	○※	
	F302	Memory error of weld parameter	Major Error	○※	
	F303	Memory error of gun parameter	Major Error	○※	
	F304	Memory error of counter parameter	Major Error	○※	
	F306	Memory error of fault history	Major Error	○※	
	F307	Memory error of encoder parameter	Major Error	○※	
	F350	Current low limit	Major Error	○	
	F360	Current high limit	Major Error	○	
	F370	Over time	Major Error	○	
	F390	Wrong parameter	Major Error	○	
Line volt fault	F400	Line volt low	Alarm	○	
	F410	Line volt high	Alarm	○	
	F450	Line clock error	Fault	○	
	F480	Timer stop	Fault	○	
Welder fault	F500	No current	Error	○	
	F521	Weld1 time short	Error	○	
	F522	Weld2 time short	Error	○	
	F523	Weld3 time short	Error	○	
	F550	Transformer over temperature	Fault	○	
Power module fault	F600	Thyristor over temperature	Fault	○	
	F650	Thyristor shorted	Fault	○	
	F660	Thyristor half cycle	Fault	○	
I/O fault	F810	Not complete welding	Fault	○	
	F825	Water flow fault	Fault	○	
	F830	Air pressure fault	Fault	○	
	F840	Weld / No weld signal error	Fault	○	
Liner encoder	F930	Original position not initialized	Fault	○	
	F931	Wrong Nut	Fault	○	
	F932	No Nut	Error	○	
	F933	Setdown distance low	Error	○	
	F934	Setdown distance high	Error	○	
Hard	F990	Timer board fault	Fault	○	

※:external reset is invalid. It is possible to release it abnormally only with the RESET button of the program box.
At this time, the memory of a pertinent part in the timer board is initialized.

9 - 2. Fault code

- Fault codes are assigned for each error. The fault code will be displayed and blinking in the data display of the program box (PB-900-**).
- The contents of the error, typical detection period and detection contents, and an example of a countermeasure will be displayed for each fault code therefore countermeasures should be performed according to the conditions.

(1). F011: Gun1 step complete

(a) The step-up completion of gun 1 is displayed.

(b) The stepper complete is output.

(c) When the stepper reset input is turned ON, or the program box reset button is pressed, the weld counter, the number of steps and the error will be cleared.

(2). F021: Gun1 product count complete

(a) The production count completion of gun 1 is displayed.

(b) The product count complete is output.

(c) When the counter reset input is turned ON, the production counter and errors will be cleared.

(3). F101-103: Weld current (1,2,3) low

(a) When the welding current becomes lower than the low limit of the set value during constant current control, an alarm will be output after the welding sequence is completed.

(b) This function will not activate during the voltage compensation control.

(c) The 1st digit of the fault code refers to the weld number (weld1 to 3) in which the error occurred.

(d) Confirm that there is no wire breakage of the wire cable, no dust or etc. is adhered to the weldment or the electrode tip. The capacity of the transformer may be insufficient. Confirm that the power supply voltage has not deteriorated by simultaneous weld, and that the current is set correctly.

(4). F151-153: Weld current (1,2,3) high

(a) When the welding current is higher than the set value of the current high limit during constant current control, an alarm will be output after the welding sequence is completed.

(b) This function will not activate during the voltage compensation control.

(c) The 1st digit of the fault code refers to the weld number (weld1 to 3) in which the error occurred.

(d) Confirm that the current or the current high limit is set correctly.

(5). F200: Heat% low

(a) When the heat % during weld is lower than the set value of the heat rate low limit, an alarm will be output after the welding sequence is completed. This function will be activated for both the constant current and voltage compensation controls.

(b) This shows that the heat % was excessively low in any of the weld1 to 3.

(c) Confirm that the current and the heat % low limit is set correctly.

(d) Confirm if there is a short in the secondary circuit.

(6). F250: Heat% high

(a) When the heat % during weld is larger than the set value of the heat % high limit, an alarm will be output after the welding sequence is completed. This function will be activated for both the constant current and voltage compensation controls.

(b) This shows that the heat % was excessively high in any of the 1st to 3rd weld.

(c) Confirm that the current and the heat % high limit is set correctly.

(d) The capacity of the transformer may be insufficient.

(e) Confirm that the line voltage has not deteriorated by simultaneous weld.

(7). F300-307: Memory error (305 unused)

(a) The system checks for errors when the power is turned ON, and notifies immediately. An alarm will not be output. The error can only be cleared by pressing the RESET button on the program box. At this time, the memory in the applicable area of the timer is initialized.

- 300: Memory error of function parameter
- 301: Memory error of common parameter
- 302: Memory error of weld parameter
- 303: Memory error of gun parameter
- 304: Memory error of counter parameter
- 306: Memory error of fault history
- 307: Memory error of encoder parameter

(b) This shows that the system data set in the memory is out of the set range.

(c) Reset the data.

(d) Please measure an original position etc. for "307".

(8). F350: Current low limit

(a) When the welding current value of the started sequence exceeds the control range lower limit (2000 A), an alarm will be output when started.

(b) Confirm that the current value is set correctly.

(9). F360: Current high limit

(a) When the welding current value of the started sequence exceeds the control range upper limit (50000 A), an alarm will be output when started.

(b) Confirm that the current value is set correctly.

(10). F370: Over time

(a) When the total set value of the weld time when started is longer than the set value of the over time, an alarm will be output.

(b) This is determined for the total weld time of weld 1, weld 2 and weld 3.

(c) Confirm that the over time is set correctly.

(11). F390: Wrong parameter

(a) When all of the weld times of weld 1, weld 2 and weld 3 are set to 0 cycles, an alarm will be output when started.

(12). F400: Line volt low

(a) When the welding source voltage becomes lower than the set value of the line volt low limit during weld, an alarm will be output after the welding sequence is completed.

(b) Confirm the power supply capacity, and perform a countermeasure to prevent simultaneous weld.

(13). F410: Line volt high

(a) When the welding source voltage becomes higher than the set value of the line volt high limit during weld, an alarm will be output after the welding sequence is completed.

(b) Confirm the facility power supply. Confirm that the value is set correctly.

(14). F450: Line clock error

(a) When the power supply frequency can not be identified as 50 Hz or 60 Hz, an alarm will be output when started.

(b) Confirm that the power supply is stable.

(15). F480: Timer stop

(a) When the stop timer input turns OFF, an alarm will be output.

(16). F500: No current

(a) When the welding current could not be detected during the weld of 1 - 3, an alarm will be output.

(b) Confirm that there is no dust on the work piece, no impurity of the chip, and that the pressure time or welding pressure is not insufficient.

(17). F521-523: Weld (1,2,3) time short

(1) When the number of weld cycles which are actually detected is less than the number of set cycles, an alarm will be output.

(2) The 1st digit of the fault code refers to the weld number (weld 1 - 3) in which the error occurred.

(3) Confirm that the squeeze time is sufficient, there are no impurities on the chip and work piece and that the work piece was welded correctly, no deterioration of the secondary cable, tightening of each secondary part is sufficient, and that the welding pressure is sufficient.

(18). F550: Transformer over temperature

(a) When the transformer thermostat input is turned OFF when started, an alarm will be output.

(b) This shows that the welding transformer had overheated.

(c) Confirm the duty factor, the circulating water temperature, and the amount of water. Confirm that the thermostat detection line is not disconnected.

(19). F600: Thyristor over temperature

(a) When the thyristor thermostat input is turned OFF during continuous monitoring, an alarm will be output.

(b) This shows that the thyristor had over temperature.

(c) Confirm the operating ratio, the circulating water temperature, and the amount of water. Confirm that the thermostat detection line is not disconnected.

(20). F650: Thyristor shorted

(a) When the thyristor short circuits during start, an alarm will be output.

(b) This shows that the thyristor had short circuited.

(c) Replace the thyristor, and confirm that the welding current and the duty factor are within the rating.

(21). F660: Thyristor half cycle

(a) If there was polarity only on one side in all of the 1 - 3 weld in the current detection results, an alarm will be output.

(b) This shows that one of the thyristors did not fire.

(c) Confirm that there was no excessive voltage fluctuation, no deterioration of the secondary-coil, poor tightening of the secondary circuit, condition of the gate signal wiring, and that the welding pressure is sufficient.

(d) Confirm that the maximum current is set correctly.

(22). F810: Not complete welding

(a) When the pilot signal input is turned OFF during the welding sequence, the weld will stop and an alarm will be output.

(b) This is only detected when the self hold is set to OFF.

(23). F825; Water flow fault

(a) When the flow switch signal is turned OFF, the timer ready signal is output an.

(b) When the flow switch input signal does start signal "ON" in the state of "OFF", warning is output.

(c) Please confirm it though cooling water flows normally.

(24). F830: Air pressure fault

(a) When the air pressure signal is turned OFF, the timer ready signal is output and OFF.

(b) During weld, the weld will stop and an alarm will be output.

(c) Confirm that the air pressure is sufficient.

(25). F840: Weld / No weld signal error

(a) When the Weld / No weld signal is turned ON, OFF and ON during the welding sequence, and alarm will be output.

(b) The weld was turned ON→OFF→ON during the welding sequence.

(c) Do not turn the weld ON→OFF→ON during the welding sequence.

(d) Confirm that the wiring for the Weld / No weld I/O is not loose.

(26). F930: Original position not initialized

(a) If the collective reference position is set to "0" while the original position for each pilot schedule is set to OFF when started, an alarm will be output.

(b) Set the original position or the global original position.

(27). F931: Wrong Nut

(a) When the gun position after the squeeze is completed is located above the nut high limit when started, an alarm will be output.

(b) Confirm that the squeeze time is set correctly.

(c) Confirm that the nut high limit and the original position are correct.

(d) Check the work piece.

(28). F932: No Nut

(a) When the gun position after the squeeze is completed is located below the nut low limit when started, an alarm will be output.

(b) Confirm that the foreign substance detection position and the reference position are correct.

(c) Check the work piece.

(29). F933: Setdown distance low

(a) When the gun position after the welding is completed is higher than the set position of the setdown low limit, an alarm will be output.

(b) Confirm that the setdown low limit is set correctly.

(c) Check the work piece.

(30). F934: Setdown distance high

(a) When the gun position after the welding is completed is lower than the set position of the setdown high limit, an alarm will be output.

(b) Confirm that the setdown high limit is set correctly.

(c) Check the work piece.

(31). F990: Timer board fault

(a) When a current of 10 cycles or more is detected while not being energized, an alarm will be output.

(b) Replace the timer board.

When abnormally generated, the fault code might not be displayed. Please refer to the trouble shoot of the attachment.

Please describe details of the situation of the occurrence etc. to 'Troubleshooting for NDZ', and transmit to our window when abnormality is not canceled by the trouble shoot.

Troubleshooting for NDZ

	Symptoms	Items to be Checked	Content to be Checked
1	It will not run ・The power supply will not turn on ・It will not start up ・The power supply will not turn on ・It will not be weld	Checking what is displayed on the program box	If nothing is displayed on the program box, please check whether the source power supply is turned on, and check the state of the four fuses of this machine. If any of the fuses is blown out, exchange it with a fuse of the same standard. There may be malfunctioning if it gets blown out again, so consult our company's contact person.
		Checking the input of the pilot signal	When the start-up switch or signal is inputted, the input can be checked by whether the Start Up LED of the program box is turned on. If the Start Up LED does not turn on, check the operating condition of the switch, and also check whether the connector or cable at the connecting portion is damaged.
		Operation of the timer	If it does not accept the start-up input, check the monitoring display on the program box. The timer is running, if the monitoring is displayed.
		Air pressure gauge, pressure reducing valve	Check the air pressure with the pressure gauge. Refer to the "Air pressure - welding pressure" diagram in the Instruction Manual, and adjust it so that the necessary air pressure will be applied.
		Checking the operation of the solenoid valve	Check the operation and power supply of the solenoid valve (electromagnetic valve).
2	An fault code is displayed on the program box		Refer to the explanations on fault codes, written in the Instruction Manual. Refer to the following items as necessary.
3	The welding is abnormal ・No current ・Weld current high ・Weld current low ・The current is unstable ・There is error in comparison with the welding ammeter ・There is faulty welding ・The energizing (welding) duration is long ・There are explosions ・There are line volt drops	The state of the electrode (dirt) The state of the work pieces, whether there is dirt on them	Cleaning and exchanging of the electrode Cleaning and management of the work pieces
		Whether the welding conditions are appropriate Whether errors are being issued Checking the monitoring values	Check whether there are any anomalies, using the monitoring items of the program box. There are cases in which fault codes will not be able to be issued when the tolerance range is too broad, such as for the line volt value or welding current.
		Displaying of the fault codes	Please refer to the explanations on fault codes.
		Whether it is set to be "Weld off" Whether the Stop button is turned on	If it is set to be "Weld off" on the program box, switch it to "Weld on." If the Stop button is switched on, switch it off. ("F480" will be displayed on the program box, when the Stop button is switched on)
		Air pressure Squeeze time	If the air pressure is insufficient, check and adjust the source pressure, and adjust the pressure reducing valve of the machine. If the Squeeze time is insufficient, it will enter into the welding cycle before the electrode arrives at the prescribed position, and proper welding will not be possible anymore.
		Checking the welding conditions	There are some ammeters that will not be able to display the welding current and the number of cycles accurately, when the down slope setting is set to anything other than "0." Set the down slope setting to the initial value "0," except in special cases.
		Checking it with the welding ammeter	If there is a considerable amount of error between the display of the welding ammeter and the monitoring value of the program box, damages to the toroidal coil or wiring are conceivable. Please check whether there is any anomaly in the appearance of the toroidal coil or wiring, and notify our company's contact person.

	Symptoms	Items to be Checked	Content to be Checked
		Drops in the power supply voltage at the primary side	Check whether there is any drop in the power supply voltage at the primary side, upon welding. The following reasons are conceivable for drops in the power supply voltage at the primary side. ・The capacity of the power supply to be supplied is too small. ・Aren't there any voltage-drops when welding is conducted in synchronization with the other welding machines? ・It will cause voltage drops if the diameter of the wires used for the primary side wiring is too small, or if their length is too long.
		Loosening of the power supply terminals	If any loosening of the power supply terminals is found, be sure to cut off the power supply, check that it is in OFF state with an electroscope, and then retighten the terminals.
4	The welding will not be completed	Malfunctioning of the timer	Please confirm welding condition LED display on the program box, and confirm which state the control is. If the displaying is not appropriate, check whether the monitoring will be displayed.
		Air pressure gauge, pressure reducing valve Foreign substances or deformation at the sliding portions	If the air pressure is insufficient, check and adjust the source pressure, and adjust the pressure reducing valve of the machine. Remove any foreign substances at the sliding portions. If you find any deformation, consult our company's contact person.
5	It gets heated up ・There is an abnormal smell ・There is a burnt or discolored portion ・There is overheating ・The temperature of the drainage of the cooling water is high ・The thermostat will function	Identifying the source of the smell	Identify the source of the smell, and if it is a smell caused by being heated up, take measures according to the cause of the heating.
		Water temperature, transformer temperature Duty factor (usage state)	Check the temperature and flow rate of the cooling water, and if the flow rate is insufficient, adjust it by adjusting the valve, etc. Using the machine in excess of the welding conditions and duty factor written on the specification name plate will cause malfunctioning, and may greatly shorten the lifespan of the product. Please use it within the range indicated on the specification name plate.
		Identifying the source of the overheating	Investigate the flow rate of the cooling water in accordance with the location of overheating, and fix it or exchange it if there is clogging.
		Checking the welding conditions and duty factor	Using the machine in excess of the welding conditions and duty factor written on the specification name plate will cause malfunctioning, and may greatly shorten the lifespan of the product. Please use it within the range indicated on the specification name plate.
		Fault code	Please refer to the explanations on fault codes.
6	Memory Check error when the power supply is turned on	Fault code	Please refer to the explanations on fault codes.
7	The program box is abnormal	Fuse Connecter connections at both sides of program box The harness	If the power supply is turned on and the displaying of the program box is off, the fuse may have blown out. Check the electrical continuity of the fuse, and exchange it if it is blown out. There may be malfunctioning if it gets blown out again, so consult our company's contact person. If there is any loosening in the connection of the connectors, cut off the power supply temporarily, connect the connectors securely, and then turn on the power supply again. Notify our company's contact person if there are damages to the harness.

	Symptoms	Items to be Checked	Content to be Checked
8	There are abnormal noises	Identifying the portion where the abnormal noises are generated	Please identify the portion where the abnormal noises are generated, and take measures corresponding to that portion.
9	Air leakage	Identifying the portion where air leakage occurs	Please fix the portion where air leakage occurs. Water hose is a component specified to be inspected upon periodical inspections, and also a component to be exchanged periodically.
10	Water leakage	Identifying the portion where water leakage occurs	Please fix the portion where water leakage occurs or exchange it. Air hose is a component specified to be inspected upon periodical inspections, and also a component to be exchanged periodically.
11	There is abnormal vibration	Play or loosening at the sliding portions	Please retighten any loosening at the tightening portions.
12	Sparks are emitted	Identifying the portion where sparks are emitted Squeeze time Poor insulation? Loosening of the terminals Fault code	Sparks may be emitted from the terminal portion if there is loosening at the power supply terminal. It will cause faulty welding or malfunctioning, so cut off the power supply temporarily, and retighten the terminals. Check whether the air pressure and squeezing time are appropriate. If the squeezing time is insufficient, the welding current will flow before the electrode arrives at the welding position, and cause explosion. Please refer to the explanations on fault codes.
13	The configured data has disappeared	The configured data has disappeared Timer trouble	Please press the Write key, when configuring with the program box. There may be malfunctioning if the configured data disappears even when this writing has been conducted, so please notify our company's contact person.
14	The power supply wires will "kick"	The settings Measurement of the welding current using the welding ammeter	The two wires may move in repulsion when a big current is applied to them, due to influence by the magnetic field. Secure the wires as necessary, in such cases.
15	The Earth Leakage circuit Breaker will trip	Whether there is any water leaks Whether there is any line-to-ground faults	If there is a water leak, cut off the power supply, fix the water leaking portion, and run it again after the portion has dried. Identify the location of the line-to-ground fault, and apply insulation treatment.

Operation-check settings for NDZ						
Squeeze	Up slope	Weld1	Cool1	Weld2	Cool2	Weld3
50cyc	3cyc	10cyc	0cyc	0cyc	0cyc	0cyc
Down	Hold	Off	Pulsation			
0cyc	15cyc	0cyc	1cyc			
Current1	Current2	Current3	Maximum current	Current (1,2,3) high limit	Current (1,2,3) low limit	Heat high limit
8.0kA	2.0kA	2.0kA	20.0kA	20%	20%	100%
Heat low limit	Current mode	Gun No.				
10%	CC	1				
Reweld	Fault reset by start input	Weld / No weld	Self hold	End of hold	Squeeze delay	End of hold delay
Off	Off	ON	Weld time self hold	Hold	0cyc	0cyc
Weld time compensation	Insufficient weld time	Line volt	Line volt low limit	Line volt high limit		
3cyc	1cyc	(Users line volt)	20%	20%		

Caution!
1.When conducting operation-checks using these welding conditions, write down the conditions that have previously been set on a program sheet, before setting them, so as not to lose the welding conditions set by the customer.
2.The content of these settings is not anything that will assure an actual welding. Set welding conditions appropriate for the work pieces, etc., after the operation-check is over.

Sheet for notifying malfunctioning state, for NDZ (for FAX transmission) (p. 1 / p .)

Date of issue:

*Please use this sheet after consulting the explanations on troubleshooting and fault codes in the Instruction Manual.

Your section name, company name		Tel number:	
		FAX number:	
Your name		Cell phone:	
		e-mail:	
Your address	Postal code:		

*About the applicable machine

Model type				Product code	
Serial number		Date of delivery		Period of use	Approx. months
Machines connected to it	Feeder Robot Others ( )				

*Your current state of usage

Main workpieces	Material:	Thickness:	mm
Number of welding points	points / workpiece	sec / unit	workpieces /day
Welding conditions	Squeeze: cyc, Up Slope: cyc, Weld1 cyc, Down Slope cyc Hold : cyc, Current: A, Current cont mode: CC · VC · HCCL , pressure kN		

Please fill your configuration data into the program sheet of the Instruction Manual, and attach it to this sheet.

Voltage	Standby: V (AC)	Energization (welding): V (AC)
Cooling water	Amount: *l*/min.	Quality: Tap water Groundwater
	Timing to exchange the circulating water: times/year	

Note: About the issue that has arisen

1	What kind of a symptom was it? (Please enter it in as much detail as possible)
2	Upon what kind of operation did it occur? (Or, in which cycle did it occur?) Installation Start of work During operation After a day off After changing the settings Others ( )
3	Did you do any irregular manipulation before it happened? Or, was there anything different from usual?
4	Is there anything that you added or changed, regarding this machine?
5	Is this the first time this symptom occurred? If it wasn't the first time, please fill in the frequency of its occurrence, or the number of times it happened.
6	Is it currently usable? If it is, please fill-in how you recovered?
7	Has this machine malfunctioned in the past? If there is a history of malfunctioning, please write an outline of the history.
8	Please fill in any requests.

If there is not enough space to fill in your answers, please fill them onto the additional sheet indicated in the next page, referring to the fill-in example.

Thank you for filling in your answers.

Sheet for notifying malfunctioning state, for NDZ (for FAX transmission) (p. 1 / p .)

Note: Please append your answers onto this sheet if there wasn't enough space on the first page.
(Fill-in example)

3 ↑ Corresponding item number in the previous page	It entered into a state with multiple alarms being issued, when trying to weld a prototype. The material quality of the prototype was XXX, and its shape was as indicated below. (You can attach drawings or pictures, as necessary.) (Drawing)

(Filling-in space)

10. Maintenances

10 - 1. Notes when performing maintenance

- Be sure to confirm that the welding power supply is shut down.
- Only specified parts can be used for replacement.

10 - 2. Fuse replacement

Two fuses (F1, F2) are located on the printed circuit board of the timer unit, and two fuses (FU01, FU02) are located on the contactor.

When a fuse is blown, replace with the following parts.

- F1 :125V 3A Normal type size ϕ 5.2×20mm
- F2 :125V 2A Normal type size ϕ 5.2×20mm
- FU01,02:600V 1A Time delay type size ϕ 10.4×38.1mm

11. Maintenance and Spare parts list

11 - 1. Maintenance parts list

Parts Name	Type／Model	Unit Name	Q'ty	Manufacturer	Parts Number	Parts Code	Remarks
Fuse (F1)	ULTSC3AN1	Timer Board	1	SOC	ULTSC3AN1	9000244315	
Fuse (F2)	ULTSC2AN1		1	SOC	ULTSC2AN1	9000244327	
Fuse (FU01, FU02)	ATQR1	Timer Unit	2	FERRAZ	ATQR1	9000003200	
SCR unit	U911-01-6876-{A}		1	DENGENSHA	U911-01-6876-{A}	3001465003	
Fuse (FU03, FU04)	ATQR3	Breaker box	2	FERRAZ	ATQR3	9000002498	UL / CSA
	KLDR3		2	Littel Fuse	KLDR3	9000003945	CE
Fuse (FU03, FU04)	ATQR3	Step Down Trans.	2	FERRAZ	ATQR3	9000002498	For include SDTr model
	ATQR6		2	FERRAZ	ATQR6	9000002513	For include SDTr model
Troidal coil	1B4N1.5D	NDZ	1	DENGENSHA	U911-30-7080-{A}	3001465344	

11 - 2. Spare parts list

Parts Name	Type／Model	Unit Name	Q'ty	Manufacturer	Parts Number	Parts Code	Remarks
Timer board (PCB01)	GMP-0626B-1	Timer Unit	1	DENGENSHA	GMP-0626B-1	9000244149	Standard
	GMP-0626E-1		1	DENGENSHA	GMP-0626E-1	9000244163	Linear encoder
Welding transformer (WT01)	ND-035-ZD	NDZ	1	DENGENSHA	ND-035-ZD	3001464897	35KVA
	ND-050-ZD		1	DENGENSHA	ND-050-ZD	3001464912	50KVA
	ND-070-ZD		1	DENGENSHA	ND-070-ZD	3001464936	70KVA
	ND-100-ZD		1	DENGENSHA	ND-100-ZD	3001464950	100KVA

11 - 3. Replaceable component list 1

Parts Name	Type／Model	Q'ty	Manufacturer	Parts Number	Parts Code	Remarks
Timer/Contactor	NWC-902-11	1	DENGENSHA	U911-01-7014-{A}	3001465104	JIS and Asia, Standard (AC400V)
	NWC-902-21	1	DENGENSHA	U911-01-7016-{A}	3001465154	UL, Standard
	NWC-902-31	1	DENGENSHA	U911-01-7024-{A}	3001465178	CE, Standard
	NWC-902-41	1	DENGENSHA	U911-01-7025-{A}	3001465180	JIS and Asia, Standard (AC200V)
	NWC-902-51	1	DENGENSHA	U911-01-7026-{A}	3001465205	JIS and Asia, Standard (AC440V)
	NWC-903-11	1	DENGENSHA	U911-01-7029-{A}	3001465231	JIS and Asia, Linear type (AC400V)
	NWC-903-21	1	DENGENSHA	U911-01-7030-{A}	3001465243	UL, Linear type
	NWC-903-31	1	DENGENSHA	U911-01-7031-{A}	3001465255	CE, Linear type
	NWC-903-41	1	DENGENSHA	U911-01-7032-{A}	3001465267	JIS and Asia, Linear type (AC200V)
	NWC-903-51	1	DENGENSHA	U911-01-7033-{A}	3001465279	JIS and Asia, Linear type (AC440V)
Breaker box	MCCBBOX-01	1	DENGENSHA	U920-20-2633-{A}	1101000214	UL, 35kKVA / 50kVA
	MCCBBOX-02	1	DENGENSHA	U920-20-2634-{A}	1101000226	UL, 70kVA
	MCCBBOX-03	1	DENGENSHA	U920-20-2635-{A}	1101000238	UL, 100kVA
	ELCEBOX-01	1	DENGENSHA	U920-20-2646-{A}	1101000240	CE, 35kVA / 50kVA
	ELCEBOX-02	1	DENGENSHA	U920-20-2647-{A}	1101000252	CE, 70kVA
	ELCEBOX-03	1	DENGENSHA	U920-20-2648-{A}	1101000264	CE, 100kVA

11 - 4. Replaceable component list 2

Parts Name	Type／Model	Q'ty	Manufacturer	Parts Number	Parts Code	Remarks
Program Box	PB-900-11	1	DENGENSHA	U911-01-1743-{A}	1101000137	JIS
	PB-900-21	1	DENGENSHA	U911-01-3812-{A}	1101000149	Asia and UL
	PB-900-22	1	DENGENSHA	U911-01-1399-{A}	1101000151	CE
Monitor Box	MB-900-11	1	DENGENSHA	U911-01-2527-{A}	1101000276	JIS
	MB-900-21	1	DENGENSHA	U911-01-3825-{A}	1101000288	Asia and UL
	MB-900-22	1	DENGENSHA	U911-01-2528-{A}	1101000290	CE
Program Cable	CB-900-03	1	DENGENSHA	U911-00-1349-{A}	1101000163	Length:3m
	CB-900-05	1	DENGENSHA	U911-00-3937-{A}	1101000391	Length:5m
	CB-900-10	1	DENGENSHA	U911-00-3938-{A}	1101000389	Length:10m
Transmitter	TSM-900J	1	DENGENSHA	U911-00-4432-{A}	1101000517	Japanese
	TSM-900E	1	DENGENSHA	U911-00-4433-{A}	1101000529	English

NWC-900 Program sheet (1/2)

DATE: NAME:

FUNCTION (F) SCHEDULE

ITEM	Maximum schedule	Self hold	End of hold	Reweld	Fault reset by start input	Select buzzer mode	Stepper	Interlock mode ※1	Select toroidal type ※2	Nut detection ※2	Electrode position compensation ※2	Setdown ※2
ADDRESS	1	3	4	5	6	7	8	9	10	20	21	22
SETTING RANGE	5/31/PNL	OFF/WELD/PULS	50/200/HOLD	OFF/ON	OFF/ON	0/1/2	OFF/STEP/LINR	0/1	STD/ISO	OFF/ON	OFF/ON	OFF/ON
INITIAL SETTING	31	WELD	HOLD	OFF	OFF	0	OFF	0	STD	OFF	OFF	OFF
0	☐5 SCHE.	☐Self hold OFF	☐50 msec.	☐OFF	☐OFF	☐Fault and weld comp.	☐OFF	☐Between 2 systems	☐DG standard	☐OFF	☐OFF	☐OFF
1	☐31 SCHE.	☐Weld time self hold	☐200 msec.	☐Reweld	☐Reset	☐Fault	☐Step up	☐Multi	☐ISO	☐ON	☐ON	☐ON
2	☐255 SCHE. (Panel)	☐Pulse start	☐Hold			☐Comp.	☐Liner up					

COMMON (C) SCHEDULE

ITEM	Squeeze delay	End of hold delay	Weld time compensation	Insuffcient weld time	Over time	Line volt	Line volt high limit	Line volt low limit	Password (weld off)	Password (writwe enable)
ADDRESS	1	2	3	4	5	6	7	8	30	31
SETTING RANGE	0 – 50	0 – 50	0 – 50	0 – 50	10 – 2000	100 – 1000	5 – 50	5 – 50	0 – 9999	0 – 9999
Unit	Cycle	Cycle	Cycle	Cycle	Cycle	V	%	%	–	–
INITIAL SETTING	0	0	0	0	1000	400	25	25	0	0
Sett value										

GUN No.

(G) SCHEDULE ※3 ※4

ITEM	Global maximum current	Global current control mode	2points calibration	Calibration base 1	Calibration base 2	Calibration current 1	Calibration current 2	Weld count	Product count	Global original position ※2
ADDRESS	1	2	4	5	6	7	8	9	10	14
SETTING RANGE	2.0 – 60.0	CC/VC/HCCL	OFF/ON	2.00 – 50.00	2.00 – 50.00	2.00 – 50.00	2.00 – 50.00	0 – 9999	0 – 9999	0/1.0 – 200.0
Unit	kA	–	–	kA	kA	kA	kA	–	–	mm
INITIAL SETTING	60.0	CC	OFF	10.00	10.00	10.00	10.00	0	0	0
Sett value										

※1;Only setting.This welder doesn't correspond to the ISO toroidal coil.
※2;Only as for the linear encoder specification, the display and the setting become possible.
※3;When shipping it, the setting matched to a fixed welder is done. (Muximum road current rating + 20%)
※4;CC;Constant current, VC;Voltage compensation, HCCL;Heat control curretn limit
※5:Only HCCL mode
※6:It becomes a demagnetization function because of the setting of 31Cycle or more.

☐2:2010/9
☐N:2009/2
DRW#:U990-40-3985-1

NWC-900 Program sheet (2/2)

DATE: NAME:

WELD (W) SCHEDULE (SCHE. No. 1～255) ※6

ITEM	Squeeze	Up slope	Weld 1	Current 1		Cool 1	Weld 2	Current 2		Cool 2	Weld 3	Current 3		Down slope	Hold	Off	Pulsation
				CC	VC			CC	VC			CC	VC				
ADDRESS	1	2	3	4		5	6	7		8	9	10		11	12	13	14
SETTING RANGE	0 – 100	0 – 100	0 – 100	2.0 – 50.0	15 – 100	0 – 100	0 – 100	2.0 – 50.0	15 – 100	0 – 100	0 – 100	2.0 – 50.0	15 – 100	0 – 50	1 – 100	0 – 100	1 – 20
Unit	Cycle	Cycle	Cycle	kA	%	Cycle	Cycle	kA	%	Cycle	Cycle	kA	%	Cycle	Cycle	Cycle	回
INITIAL SETTING	50	0	0	2.0	15	0	0	2.0	15	0	0	2.0	15	0	1	0	1
SCHE.																	

WELD (W) SCHEDULE (SCHE. No. 1～255) ※4 ※5 ※2 ※2 ※2 ※2 ※2

ITEM	Initial current heat%	Maximum current	Current control mode	Current1 high limit	Current1 low limit	Current2 high limit	Current2 low limit	Current3 high limit	Current3 low limit	Heat high limit	Heat low limit	HCCL mode current limit	Temper cool	Original position	Nut high limit	Nut low limit	Setdown high limit	Setdown low limit
ADDRESS	15	16	17	19	20	21	22	23	24	25	26	28	50	56	57	58	59	60
SETTING RANGE	OFF/ 15 – 80	OFF/ 2.0 – 60.0	OFF/CC /VC/HCCL	3 – 50	3 – 50	3 – 50	3 – 50	3 – 50	3 – 50	20 – 200	10 – 100	2.0 – 50.0	0 – 1000	OFF/ 1.0 – 200.0	0.1 – 20.0	-9.9 – -0.1 0.1 – 20.0	0.00 – 20.00	0.00 – 10.00
Unit	%	kA	–	%	%	%	%	%	%	%	%	kA	Cycle	Cycle	mm	mm	mm	mm
INITIAL SETTING	OFF	OFF	OFF	20	20	20	20	20	20	100	10	2.0	0	OFF	20.0	1.0	20.00	10.00
SCHE.																		

STEPPER

ITEM	Increase [%] (WELD (W) SCHEDULE (SCHE. No. 1～255))									Weld count [Count] (GUN No. (G) SCHEDULE)								
ADDRESS	41	42	43	44	45	46	47	48	49	20	21	22	23	24	25	26	27	28
SETTING RANGE	50 – 200									0 – 1000								
INITIAL SETTING	100									0								
Step	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
GUN No. 1																		

※1;Only setting.This welder doesn't correspond to the ISO toroidal coil.
※2;Only as for the linear encoder specification, the display and the setting become possible.
※3;When shipping it, the setting matched to a fixed welder is done. (Muximum road current rating + 20%)
※4;CC;Constant current, VC;Voltage compensation, HCCL;Heat control curretn limit
※5:Only HCCL mode
※6:It becomes a demagnetization function because of the setting of 31Cycle or more.

□2:2010/9
□N:2009/2
DRW#:U990-40-3985-2

13. Option

For the model equipped with the linear encoder, functions of the no nut detection and the detection etc. of the amount of the setdown of the nut are provided.

13 - 1. Wrong nut and No nut function

The function becomes effective by turning ON 'Nut detection' of F schedule.

- It is a function to detect the height of the nut (work) and to detect the no Nut.
- It is a function to detect the foreign body when a foreign body that is higher than the height of the nut is placed.
- Operation explanation

Figure below ① is normal when the position of the upper electrode point is between the Nut high limit and the Nut low limit. ② the upper electrode positions are higher than the Nut high limit, and it becomes a Wrong nut.

When the position of the upper electrode is lower than that of the Nut low limit, ③ becomes a No nut.

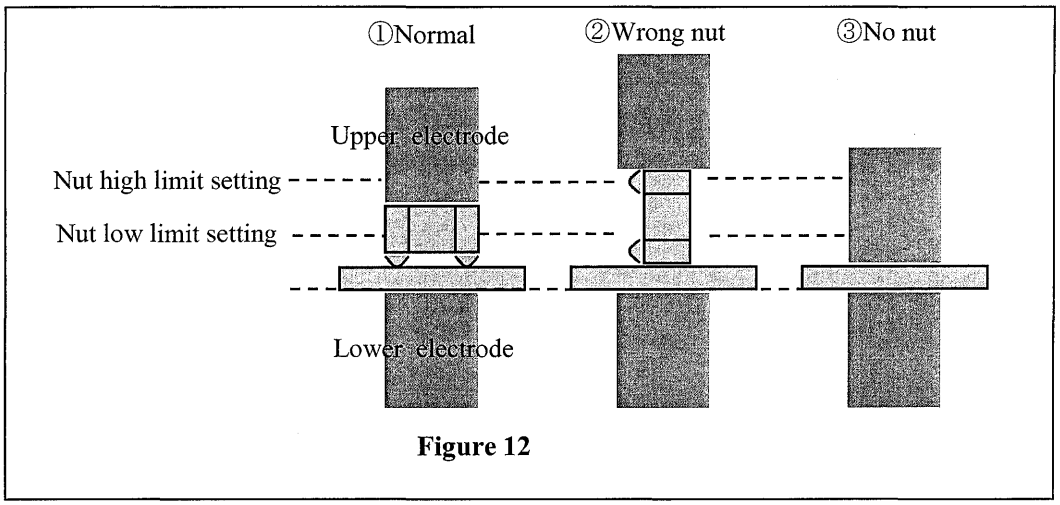


Figure 12

- Setting items

Nut high limit:

The permissible value of the height when the nut (work) is placed is set by the distance from a original position. Figure 14

Nut low limit:

The lower bound value to detect the permissible value or the no nut of the low degree when the nut (work) is placed is set by the distance from an original position. Figure 14

Original position:

The position that becomes the standard of the nut high limit and the nut low limit is set by the distance from the electrode liberating position. A standard position can be measured by the automatic operation by doing the test pressurizing. It becomes standard ① or standard ② positional work of a lower electrode. Figure 13

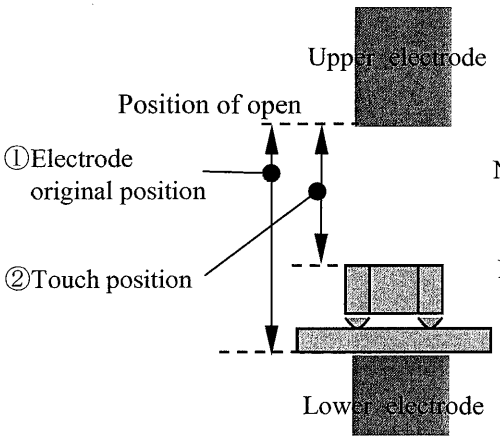


Figure 13

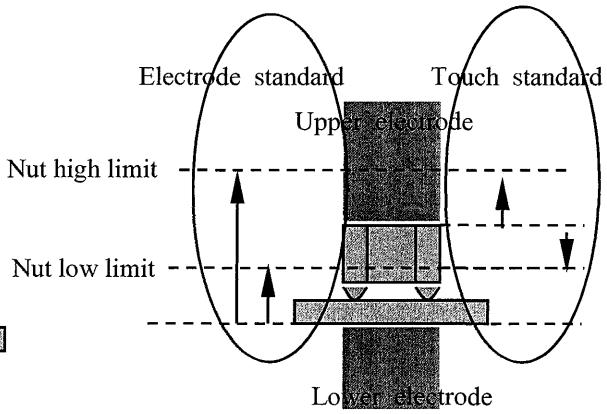


Figure 14

■ Measurement of original position

<Auto input procedure of the original position by pressure test operation>

① Turn "ON" the Nut detection, and set the timer to the pressure test mode.

② Set the work piece (condition without a work piece can be used as a reference)

③ Turn ON the "Pilot" input signal.

④ After the electrode is lowered save the current position where the timer checks the stopping of the electrode by the predetermined time (100msec or more), into the 'collective reference position' of the gun schedule and the 'Global original position' of the weld schedule. (The measurement results are also memorized in the Touch position monitor.)

⑤ When the saving is completed normally, "Set" will be displayed on the data display of the Program box or Monitor box.

■ Setting method at nut high limit and nut low limit

Nut high limit :

An initial value is 20.0mm.

The permissible value is set by the distance from a standard position if necessary.

Nut ow limit : (Figures 14)

An initial value is 1.0mm.

The permissible value is set by the distance from a standard position if necessary.

The distance is set for a work positional standard by "Value of the minus".

※ Please set or measure a standard position again might mis-detect error when you exchange electrodes.

■ Confirming the operation of foreign body and no works detecting function

"OFF" Weld is done. It is possible to confirm the operation by setting the 'Nut detection at "Weld OFF"' setting of the cancer system to "ON" like the foreign body and the no works detecting function.

13 - 2. Table for not works detection operation

Setting/input			Error judgment operation	Note
Nut detection Setting	Weld / No weld Input	'Nut detection at "Weld OFF"' setting		
OFF	OFF	Set invalidity	—	—
OFF	ON	Set invalidity	—	—
ON	OFF	OFF	It doesn't judge.	When trying (The weld complete signal is output.)
ON	OFF	ON	It judges.	When confirming the operation detecting the no works
ON	ON	Set invalidity	It judges.	When the Weld / No weld is turning on, the setting 'Nut detection at "Weld OFF"'detection becomes invalid.

※ The detect function doesn't operate normally when it makes a mistake in the setting.
Please use it after confirming the function operates normally by the test operation before it actually uses it.

13 - 3. Setdown detection

The function becomes effective by turning ON 'Setdown' of F schedule.

- The amount of the setdown when the nut projection etc. are welded is detected.
- Abnormality of Setdown distance low and Setdown distance high is detected from the detected amount of the setdown.
- Operation explanation

  The position in which the electrode placed the nut (work) is detected. And, the distance of the electrode from after it welds to end of hold is measured, and the amount of the setdown is detected.

  If the detected amount of the setdown is a permissible value in Setdown low limit/Setdown high limit, it becomes a normal termination. It becomes abnormal of Setdown distance low when the detected amount of the setdown is smaller than that of Setodown low limit, and when it is larger than Setdown higt limit, it becomes abnormal of Setdown distance high.

- Setting items

  Setdown high limit:The high limit of the amount of the setdown is set.

  Setdown low limit: The low limit of the amount of the setdown is set.

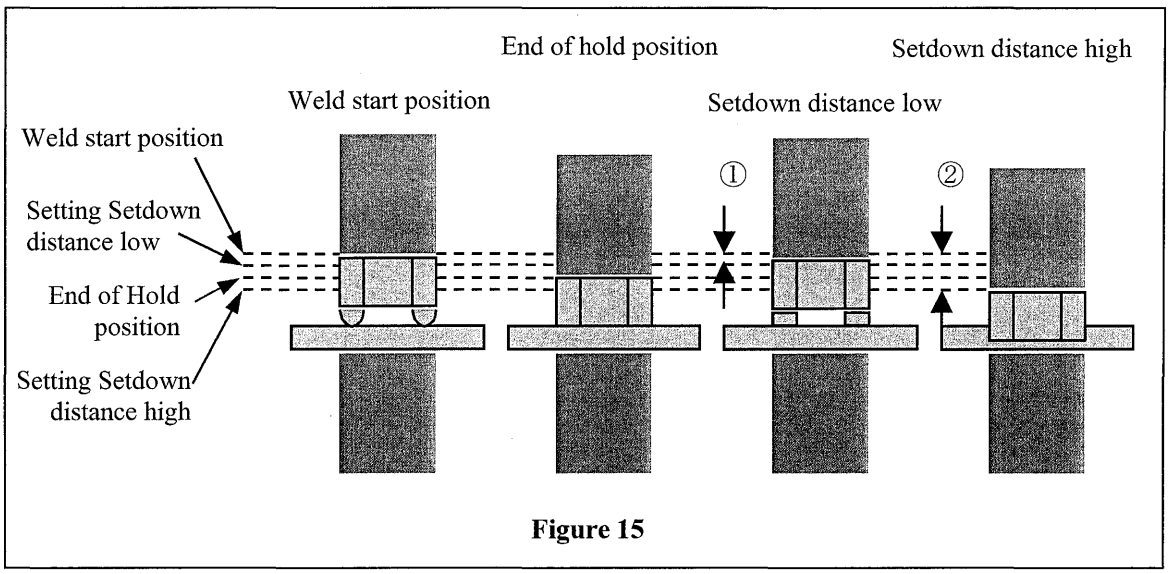


Figure 15

13 - 4. Feeder Interface connector

It is possible to connect it easily with the feeder by one connector.

(1) Outline and connector

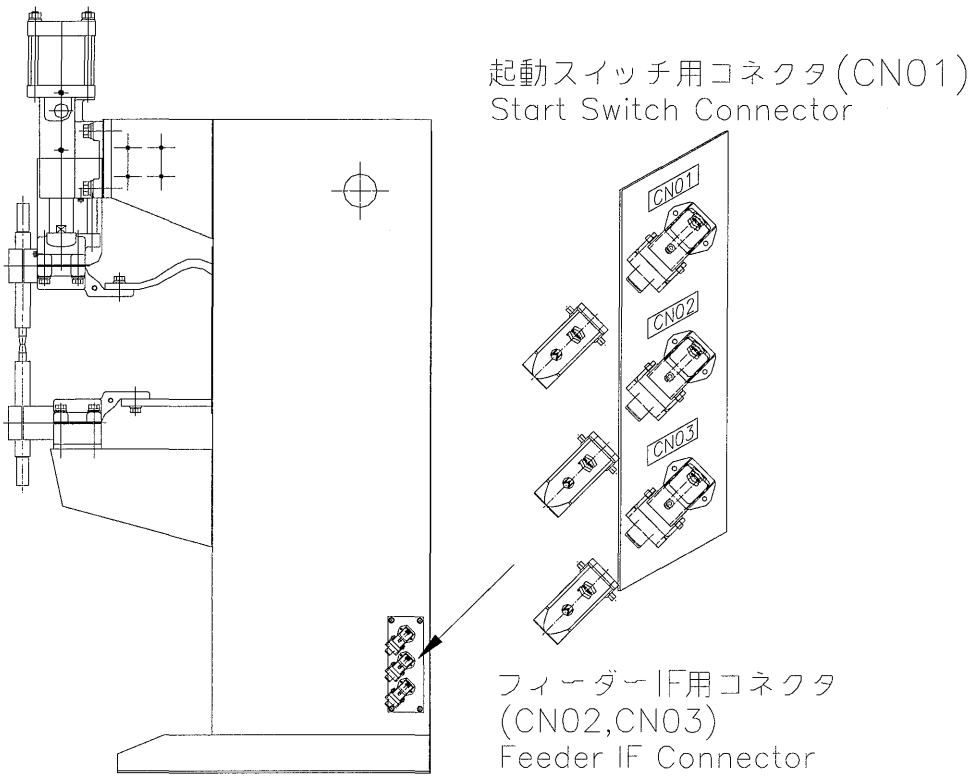


Figure 16 NUT Feeder Interface connector

CN01 : Connector for start switch

The start switch such as the foot switches is connected.

The connection can be selected from the following connector.

HARTING	HAN 4A
NANAHOSHI	NCS-25

CN02 : Connector for feeder IF

It is possible to connect from the feeder, and to start with the start switch of CN01.When the nut and the bolt feeder is connected, it uses it.

HARTING	HAN 7D

CN02 : Connector for feeder IF (for bolt feeder)

The pressurizing signal from the bolt feeder is connected.

HARTING	HAN Q5/0

(2) Connector wiring diagram

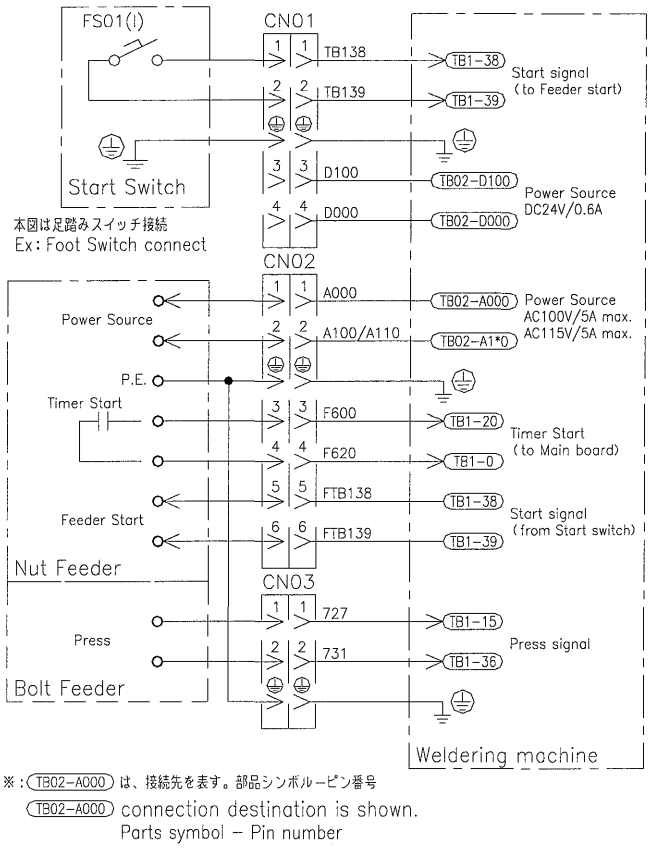


Figure 17 Connector wiring diagram

- Main body connector and wiring are common in the model for all feeders. (bolt/nut).

  Feeder side wiring :

  Only CN02 is a connection at the nut feeder specification.

  CN02 and CN03 are connections at the bolt feeder specification.

- Feeder start signal

  The CN02 of the feeder connection model is connected with the start switch pin1,pin2 (foot switch etc.) and TB01 pin38,pin39.

  In a standard setting when it shipping, the feeder starts with start switch ON. And, the welding machine starts by the signal from the feeder.

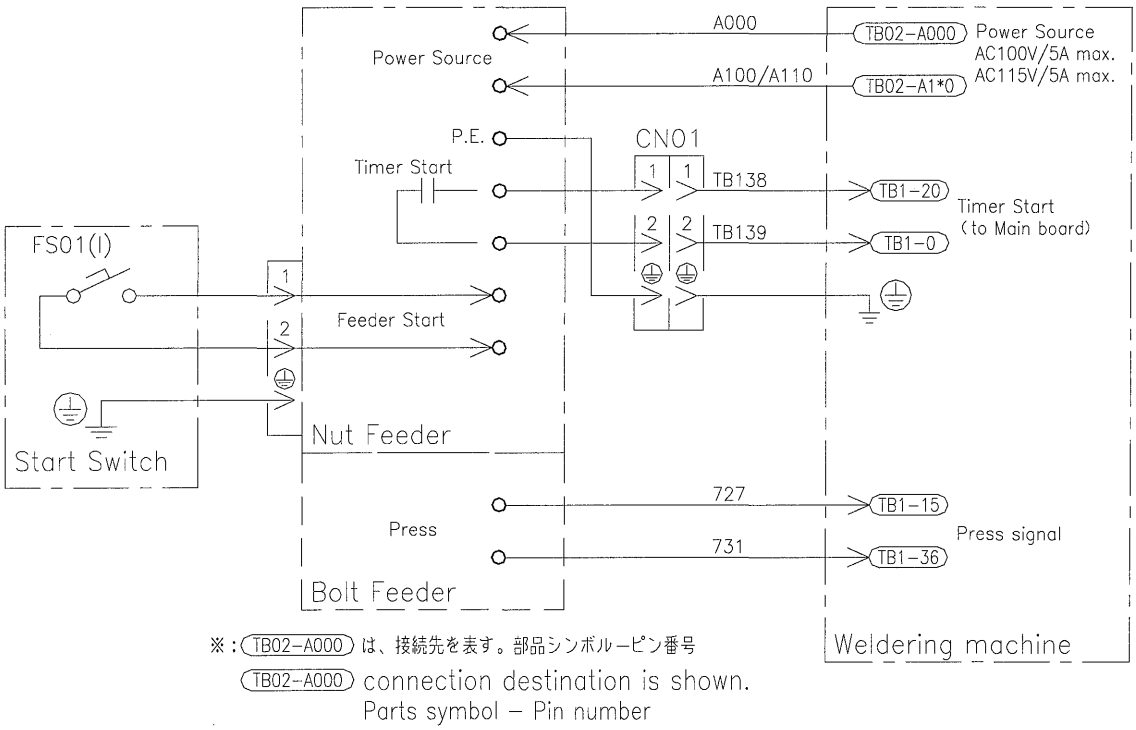
  The welding machine is not started with start switch ON when there is no feeder connection in the feeder connection model.

(3) Feeder connector wiring (spot and direct feeder wiring)

① When the feeder is connected and used for start switch connector (CN01)

Please change from 39 pins to 0 pins until 20 pins from 38 pins of TB1.

			Before (at shipping)		After
CN01	Pin 1(TB138)	TB1 (PCB01)	Pin 38	→	Pin 20
	Pin 2(TB139)		Pin 39	→	Pin 0



② When using it without connecting the feeder (Excluding the spot specification)

Please buy a feeder short connector .A feeder short connector is connected with connector (CN02) for feeder IF

Or, please change wiring like ①.

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