

Panasonic®

Controller for resistance welder Operating Instructions

Model No. **YF-0201Z5**



Before operating this product, please read the instructions carefully and save this manual for future use.

First of all, please read "Safety precautions" or "Safety manual".

TSM80344

◆ Introduction

This is the operating instructions for YF-0201Z5 series.








First of all, please read and understand this operating instruction for proper and safe operation.

◆ Features

- A wide selection of welding sequences and functions. (15 conditions, 2-step welding with 9-pulsation)
- Current incrementing function (selectable between step-up and signal-up) enabling the longer service life of the electrode and facilitating the electrode control.
- Production counter and welding counter (incrementing/decrementing type) to control the production and to prevent careless errors.
- External input/output terminals facilitating for use with a robot or automatic welding machine.

◆ Warning symbols for safe usage

Each symbol describes things to be observed to prevent you and other personnel from hazardous conditions or damage to property..

<ul style="list-style-type: none"> • Each symbol below describes things to be observed to prevent you and other personnel from hazardous conditions or damage to property. 		<ul style="list-style-type: none"> • The following symbols indicates things to be observed. 	
 Danger	A hazardous situations including death or serious personal injury is imminent.		Things that MUST NOT be performed.
 Warning	The potential for a hazardous accident including death or serious personal injury is high.		Things that MUST be performed.
 Caution	The potential for hazardous accident including light personal injury and/or the potential for property damage are high.	 	Things attention must be paid to.

- The description of this manual is based on the contents as of **January, 2009**.
- The contents of this manual are subject to change without further notice.

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1. Safety precautions



WARNINGS

Welding power source

Observe the following instructions to prevent the hazard.

- (1) Never use the welding power source for other than welding purpose. (e.g. Never attempt to use the welding power source for pipe thawing.)
- (2) It is very important to comply with all instructions, safety warnings, cautions and notes mentioned. Failure to do so can result in serious injury or even death.
- (3) Work of driving source at the input side, selecting work site, handling, storage and piping of high pressure gas, storage of welded products and also disposal of waste should be performed according to the operating instruction and national, state and local codes and regulations.
- (4) Prevent any unauthorized personnel to enter in and around the welding work area.
- (5) Magnetic fields from high currents can affect pacemaker operation. If you wear a pacemaker, consult your physician before going near welding operations.
- (6) Only educated and/or skilled persons who well understand this welding power source should install, operate, maintain and repair the unit.
- (7) Only educated and/or skilled persons who well understand the operating instruction of the unit and are capable of safe handling should perform operation of the unit.

Against electric shock



Observe the following instructions to prevent the hazard.

- (1) Do not touch any charged parts without secondary conductors.
- (2) Grounding of the case of the welding power and base metal or a jig electrically connected to the base metal must be performed by educated and/or skilled persons.
- (3) Before installation or maintenance work, turn off power at the power box, wait it for at least five minutes to discharge capacitors. Significant voltage may exist on capacitors after turning off power at the power box so it is imperative to check to make sure that no charged voltage present at capacitors before touching any parts.
- (4) Do not use undersized, worn, damaged or bare wired cables.

- (5) Connect cables completely and insulate connection parts.
- (6) Keep all cases, panels and covers securely in place.
- (7) Do not handle the welding power source with torn or wet gloves.
- (8) Turn off all equipment when not in use.
- (9) Perform periodic checks without fail and repair or replace any damaged parts before using the power source.
- (10) As for coolant water, use quality water with few sediment and 5000 Ω•cm or more in resistance.
- (11) Use big enough size of cables and hoses for applied power and pressure.

Space between electrodes



Observe the following instructions to prevent injuries.

- (1) Do not put your hands, fingers or arms in the gap between electrodes, or part of your body may be caught by the electrodes resulting in injury or bone fracture.
- (2) Prior to turning on power or supplying compressed air, confirm safety around the welding machine.
- (3) Turn off all equipment including compressed air and coolant water if not in use.

Against fire, explosion or blowout



Observe the following cautions to prevent fires explosion or blowout.

- (1) Remove any combustible materials at and near the work site to prevent them from being exposed to the spatter. If they cannot be relocated, cover them with a fireproofing cover.
- (2) Do not conduct welding near combustible gases.
- (3) Do not bring the hot base metal near combustible materials immediately after welding.
- (4) Properly connect cables and insulate connected parts. Improper cable connections or touching of cables to any electric current passage of the base metal, such as steel beam, can cause fire.
- (5) Keep a fire extinguisher near the welding site for an emergency.



CAUTIONS

Installing shielding (curtain etc.)



Welding flash, flying spatter, slugs, and noise generated during welding can damage your eyes, skin and hearing.

- (1) When welding or monitoring welding, wear safety glasses with sufficient light blocking performance or use a protective mask designed for welding operation.

- (2) When welding or monitoring welding wear protective clothes designed for welding operation, such as leather gloves, leg cover and leather apron, and also wear long-sleeve shirts.
- (3) Install a protective curtain around the welding manipulator site to prevent the arc flash from entering the eyes of people in the surrounding area.
- (4) Be sure to wear noise-proof protective equipment if the noise level is high.

2. Specifications

Attention

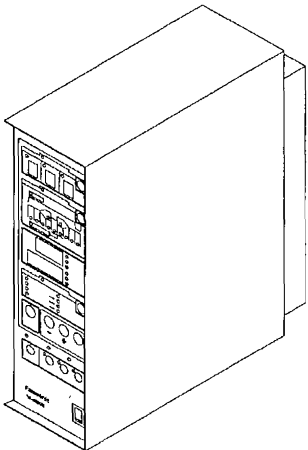
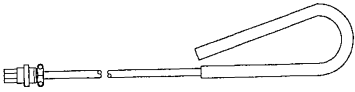
- After the initial installation or replacing welding power source, make sure to set the maximum current value of the applied welding power source.
- If the set value and the maximum current value differ greatly, current won't be supplied correctly.

2.1 Rated specifications

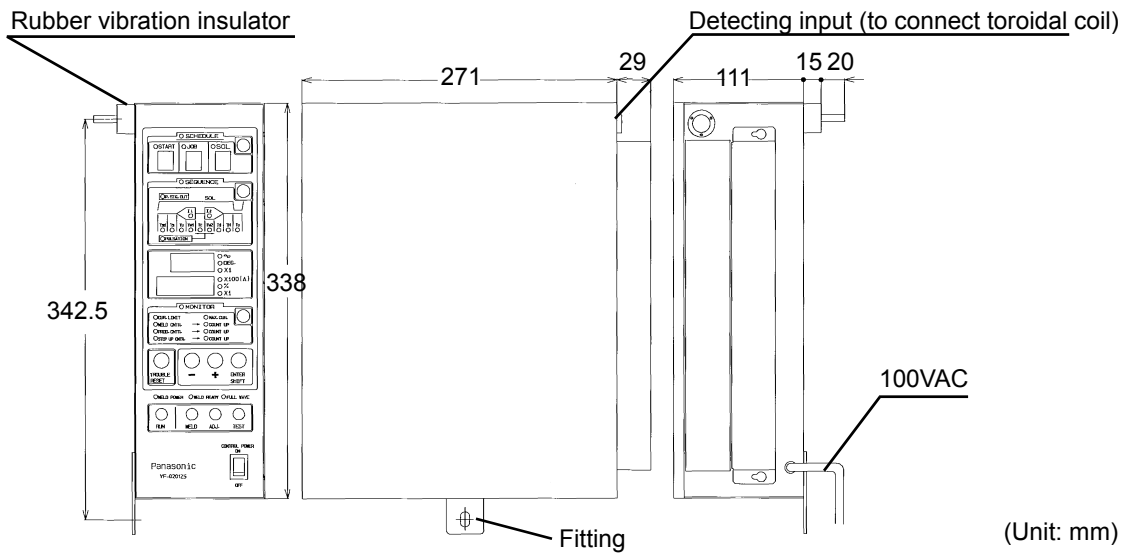
Model number	-	YF-0201Z5HGF
Rated control power (*) (Allowable range)	VAC	100 (±10%)
Welding power (*) (Allowable range)	VAC	220/440 selectable (-20% to +10%)
Rated frequency	Hz	50/60, auto switching
Main circuit switching method	-	Phase control by thyristor
Dimensions	mm	111 (W) x 300 (D) x 338 (H)
Mass	kg	5
Accessory	-	Toroidal coil (TSMX0007): 1 set

(*) It is necessary to apply power to both controller and welding machine to operate this controller. Settings can be performed while only the controller is turned on.

2.2 Appearance

This product	Accessory
	<p>Toroidal coil (TSMX0007)</p> 

2.3 Dimensions



2.4 Performance

(1) Current control range

Lower limit of the constant current control range is 30% of the maximum output current of the applied welding machine. (As for the maximum current setting, set the maximum current of the applied welding machine.)

- Constant current control
 - Welding current setting range: 1,500A - 50,000A
 - Primary current control range: 1,600A or less (Primary constant current [Note](#))
- Supply voltage compensation control
 - 30 to 100% of the maximum current value of the welding machine

(2) Control speed

- Secondary constant current control: Switching between 0.5 cycle and 1 cycle
- Primary constant current control: 1 cycle
- Supply voltage compensation control: 1 cycle
- Initial response: 2 cycle

(3) Compensation accuracy (an error to the full scale current value.)

- Constant current control
 - With respect to "Supply voltage fluctuation" ($\pm 10\%$): $\pm 2\%$ or less
 - With respect to "Resistance load fluctuation" ($\pm 10\%$): $\pm 2\%$ or less
 - With respect to "Inductive load fluctuation" ($\pm 10\%$): $\pm 2\%$ or less
 - With respect to "Ambient temperature change" (0-40°C): $\pm 5\%$ or less
- Supply voltage fluctuation compensation control
 - With respect to "Supply voltage fluctuation" ($\pm 10\%$): $\pm 5\%$ or less

Note

In case of "Primary constant current", the current becomes out of control range if "the maximum current" divided by "welding transformer turn ratio" exceeds 1,600A.

3. Installation

3.1 Installation site



CAUTION

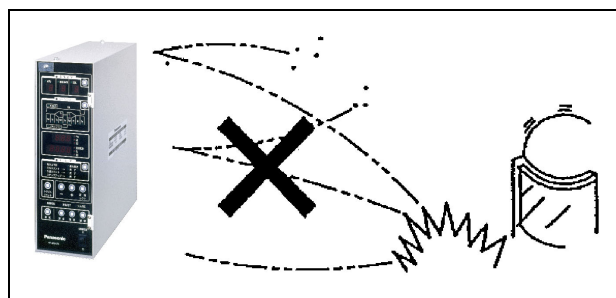
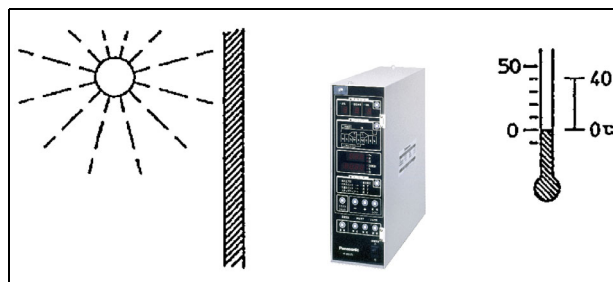
This product is designed for indoor use only.
Do not install it in any places subject to rain or water spray.

- (1) Indoors, not subject to direct sunlight or rain, with less moisture and dust.
- (2) Ambient temperature: 0 °C to 40 °C and free from freezing.
- (3) Places where no toxic, corrosive or explosive gas exists.
- (4) Places where the product is not likely to take in metallic foreign substances.
- (5) Places where no electromagnetic wave noise is to be generated.


* If the product is installed near the noise generation source, the noise may invite malfunction. Install the product carefully not to lay the control cables, such as input/output signal cable for start input, near the noise source.


Note

- When this machine is newly installed or when the welding machine is replaced with another one, set the maximum current value suitable for the applied welding machine. (Please note the setting of significantly unsuitable maximum current value causes improper current to flow.)
- The retention period of the backup data memory is one month. If the data is lost due to long-term stoppage, turn on the power switch, charge the backup capacitor for about five minutes, and then enter the data again.



3.2 Connections

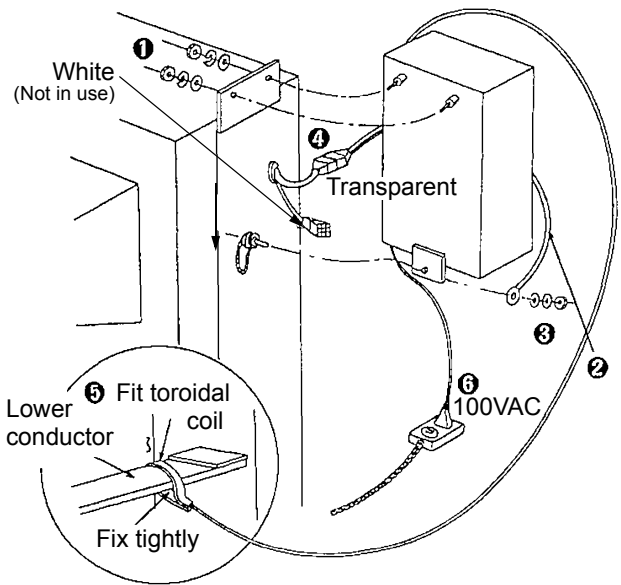
	WARNING	Prior to connection work, turn off power to the line disconnect device and all input power.
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	CAUTION	Do not perform connection work with wet hands.
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Note	Make sure that only qualified persons or persons who are familiar with welding machines take case of the connection work.
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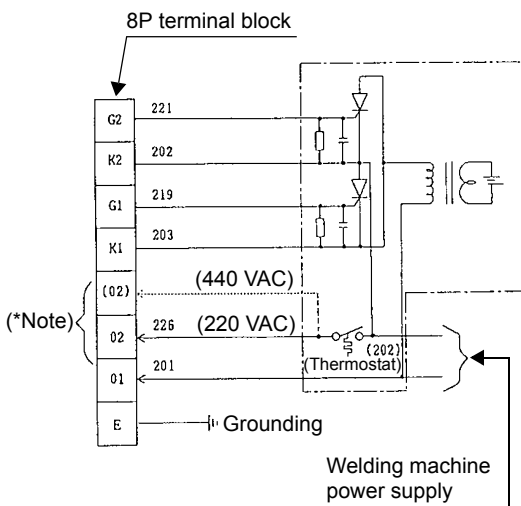
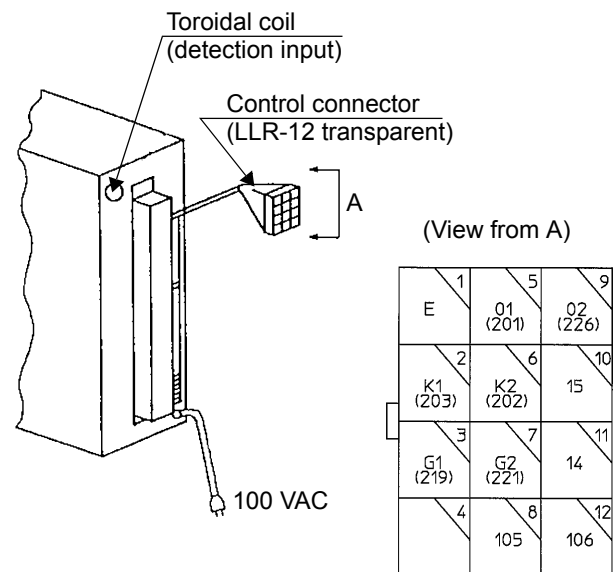
3.2.1 Mounting on the welding machine

- (1) Tighten the each wire with flat washer, spring washer and hexagon nut. (M6) Fit the grounding wire (green) to the welding machine.
- (2) Connect the connector.
 - <Note>
If the welding machine is provided with two connectors, make sure to connect to the transparent one. As for the other connector (white one), as it is not used, insulate it with vinyl tape or the like.
- (3) Fit the toroidal coil. (See lower right figure for detail.)
 - Note:** If "C.T." is provided as accessory (instead of "toroidal coil"), see section "When the primary constant current system is selected" in "Applied function".
- (4) (Connect the input cable (100 VAC) to the 100 VAC power supply.



Note

- The welding power supply voltage is factory set to 220 VAC at shipment. In case of using it at 440 VAC, it is necessary to change the connection of wire #226 to the 8P terminal block at the rear side of this product. (from "02" to "(02)"). (See below figure for detail.)
- Do not lay control cables (input/output signal for starting input) near noise source, such as the TIG arc welding machine. Otherwise, the product may malfunction due to the noise.

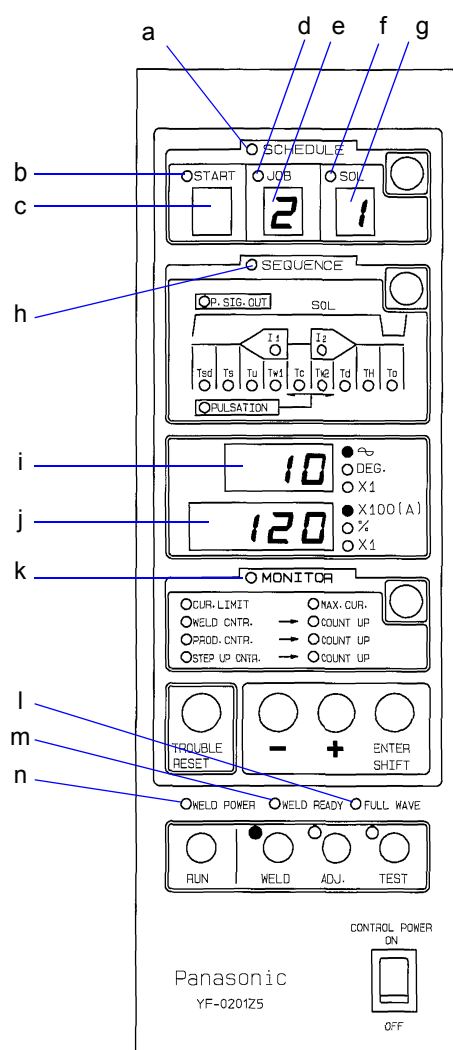


4. Basic operation

4.1 Names and functions

4.1.1 Operation panel

1) Lamps and indicators

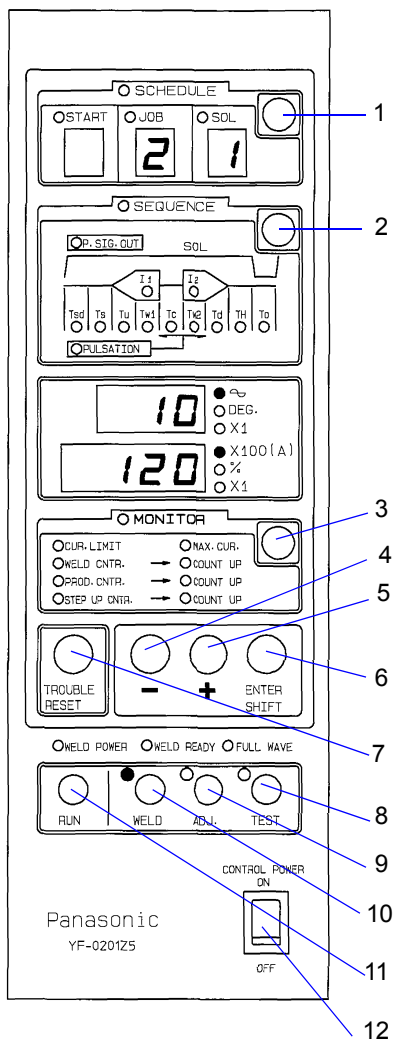


- a. SCHEDULE lamp
Lights when the schedule (job No. setting) mode is selected.
- b. START lamp
Lights when the starting No. is selected in the schedule mode.
- c. Starting No. indicator
Shows the starting No. (1 to 4).
- d. JOB lamp
Lights when the job No. is selected in the schedule or sequence mode.
- e. Job No. indicator
Shows the job (welding sequence) No. (1 to 9, A to F).
- f. SOL lamp
Lights when the SOL No. is selected in the sequence mode.
- g. SOL No. indicator
Shows the SOL No. (I or II).
- h. SEQUENCE lamp
Lights when the sequence mode is selected.
- i. Data indicator A
Shows the data during operation (welding cycle, conduction angle, welding count and trouble code) and various data in the sequence and monitor modes.
- j. Data indicator B
Shows the data during the operation (welding current, product count and trouble code^(*)), the mode during the operation and various data in the sequence and monitor modes.
- k. MONITOR lamp
Lights when the monitor mode is selected.
- l. FULL WAVE lamp
Lights when the welding current reaches the limit and current larger than it cannot be carried.
- m. WELD READY lamp
Lights when the machine enters operation mode while the power to the controller and the welding machine are on.
- n. WELD POWER lamp
Lights when the power to the welding machine is turned on.

(*): When the error code is 09s, the indicator displays the last digit of the code. (For example, if the error code is "09-1" the indicator displays "1".)

Basic operation

2) Keys



1. SCHEDULE mode select key
Enables to set welding conditions
2. SEQUENCE mode select key
Enables to set sequence data
3. MONITOR mode select key
Enables to set monitor data
4. “-” key
Pressing this key decrements the number by the minimum unit. Keeping pressing it changes the number fast.
5. “+” key
Pressing this key increments the number by the minimum unit. Keeping pressing it changes the number fast.
6. ENTER/SHIFT key
Pressing this key stores the data and changes the panel display to the next step. Keeping pressing it changes the display fast.
When this key is pressed together with “TROUBLE RESET” key, the data is stored while the panel display returns to one step before.
7. TROUBLE RESET key
Use it reset the trouble state.
8. TEST key
Enables to test the welding sequence. The preset sequence is executed when the start input is turned on, however, the welding current does not flow.
“CH2” is displayed on the data indicator B.
9. ADJ key
Enables the adjustment. Only the pressing operation is performed while the starting input is on.
Use this mode for electrode positioning and dressing.
“CH1” is displayed on the data indicator B.
10. WELD key
Enables to start the preset welding sequence. When the start input is turned on, the welding sequence is executed.
11. RUN key
Use it to switch to the operation mode. Press this key for about one second to switches the mode to “Operation” mode.
12. CONTROL POWER key
Turns ON/OFF the 100VAC input power of this product.

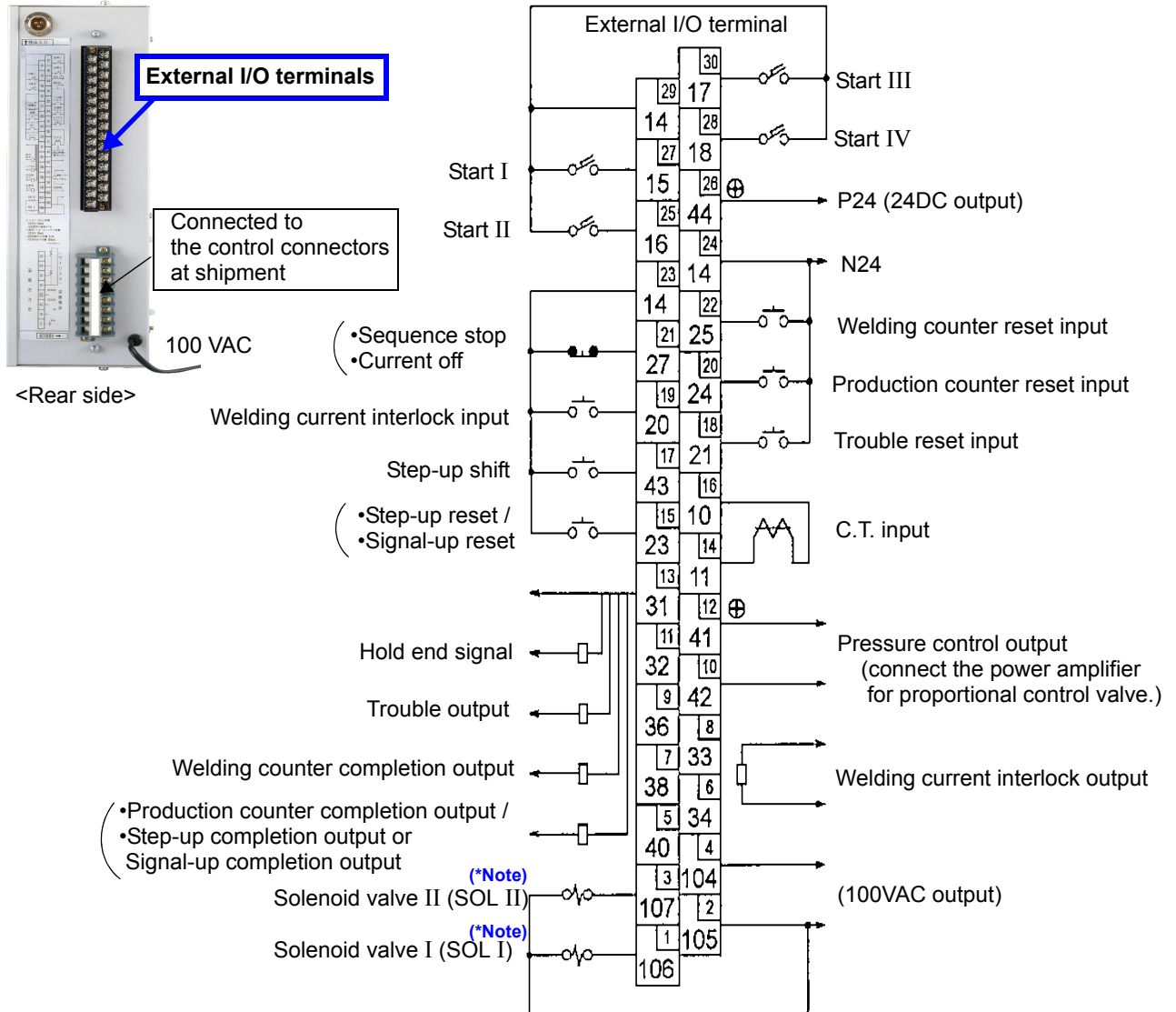
4.1.2 Rear panel

1) External input/output terminals

● Location and arrangement

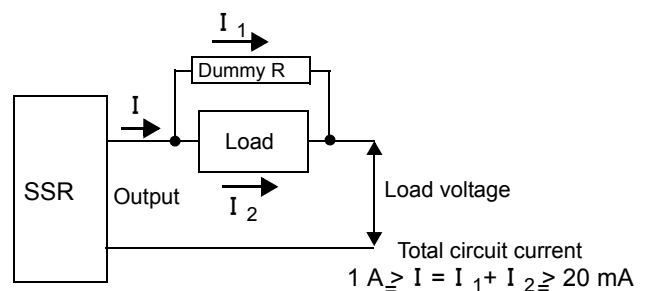
The external input/output terminals are located at the rear side of the product.

* See also the circuit diagram for connection work.



(*Note)

As SOL I and SOL II are SSR outputs, they output 100VAC even in the waiting (or standby) state. Minimum load current of the circuit is 10mA. If the product is used below the minimum load current value, the remnant voltage may cause malfunctions. In case of using in such condition, connect a dummy resistor in parallel with the load and keep the total circuit current (that flows load and dummy resistor) at 20 mA to 1 A.



Basic operation

● External input terminals

Name	Description	Switch means
● Start I	<ul style="list-style-type: none"> Short-circuit the terminals to start welding operation. With 4-schedule start mode: welding condition corresponding to the start input. With 15-schedule start mode: those four start inputs are used as binary code to select a welding condition. 	DIP switch: DPSW1-1 (To select a starting mode)
● Start II		
● Start III		
● Start IV		
● Sequence stop / Current off	<ul style="list-style-type: none"> Normally it is short-circuited. Open the terminals for "sequence stop" or "current off" depending on the DIP switch setting. 	DIP switch: DPSW1-9 (To select a current off mode.)
● Welding current interlock input	<ul style="list-style-type: none"> It keeps the welding current to flow while receiving the interlock signal from another machine without moving onto up-slope state. 	-
● Step-up shift	<p><When DIPswitch setting is for "Step-up" mode> Input to shift to the next step.</p> <p><When DIPswitch setting is for "Signal-up" mode> Input to increase the welding current by the preset incremental rate.</p>	DIP switch: DPSW1-10 (To select a current incremental method.)
● Step-up reset or ● Signal-up reset	<ul style="list-style-type: none"> An input to reset the "Step-up" or "Signal up" counter to zero. Use the input when needed such as at the time the electrode tip is replaced. 	DIP switch: DPSW1-10 (To select a current incremental method.)
● Welding counter reset input	<ul style="list-style-type: none"> An input to reset the welding counter to zero. 	-
● Production counter reset input	<ul style="list-style-type: none"> An input to reset the production counter to zero. 	-
● Trouble reset input	<ul style="list-style-type: none"> An input to reset the trouble output. 	-
● C.T. input*	<ul style="list-style-type: none"> An input to be used when "Primary constant current" is selected as current detecting system. In that case, connect CT to this terminal. (CT type: FTU02003) 	DIP switch: DPSW1-6 (To select a current detecting system.)

* As for "Switch means", see section "Advanced function: Selecting functions" for details.

Note

Use no-voltage signal; such as no-voltage relay contact or open collector output, to short-circuit or open the input terminals. Applying voltage to the input terminal damage the P.C. Board.

● External output terminals

Name	Function	Switch means
● Hold end signal	<ul style="list-style-type: none"> An output that is turned on for 150 msec. (0.15 s) after the end of the hold time. This signal does not output when the trouble output is on. Normally open contact Load at resistance load: 24 VDC, 30 mA or less. 	-
● Trouble output	<ul style="list-style-type: none"> An output that is turned on when a major trouble occurs. Input the "Trouble reset input" to reset. It is factory set to "normally open" at shipment. Load at resistance load: 24 VDC, 30 mA or less. 	JP1 (To select a contact type.)
● Welding counter completion output	<ul style="list-style-type: none"> An output that is turned on when the counter reaches the preset welding count. Input the "Welding counter reset input" to reset the counter to zero. Normally open contact Load at resistance load: 24 VDC, 30 mA or less. 	-
<ul style="list-style-type: none"> ● Production counter completion output or ● Step-up completion output or Signal-up completion output 	<p><When is set to "Production counter completion output" mode> the signal is turned on when the counter reaches the preset number of products.</p> <ul style="list-style-type: none"> Input the "Production counter reset input" to reset to zero. <p><When it is set to "Step-up completion output" mode> the signal is turned on when "step-up" or "Signal-up" (depending on the current incremental method setting) is completed</p> <ul style="list-style-type: none"> Input the "Step-up reset input" to reset the counter to zero. 	JP2 (To select a counter completion output type.) DIPswitch: DPSW1-10 (To select a current incremental method.)
● Pressure control output	<ul style="list-style-type: none"> Connect the power amplifier when the proportional control valve (optional) is applied. 	DIP switch 2-1 (To use this function)
● Welding current interlock output	<ul style="list-style-type: none"> An output to interlock welding current with another unit. An output that is turned on while welding current is flowing (from the start of the upslope to the end of the down-slope.) The signal does not output when the "Current off" is selected. Normally open contact Load at resistance load: 24 VDC, 30 mA or less. 	-
● SOL I (Solenoid valve 1)	Connect the solenoid valve for pressing (100 VAC) <ul style="list-style-type: none"> As they are SSR output, 100 VAC is output even in ready state. 	-
● SOL II (Solenoid valve 2)		-
● 24 VDC output	An auxiliary power for an external device. Make sure to use it at 100 mA or less. Do not use it to any device that generates noise. Polarity: 44 (positive), 14 (negative)	-
● 100 VAC output	An auxiliary power for an external device. Make sure to use it at 0.2 A or less. Do not use it to any device that generates noise.	-

* As for "Switch means", see section "Applied function: Selecting functions" for details.

4. 2 Setting welding conditions

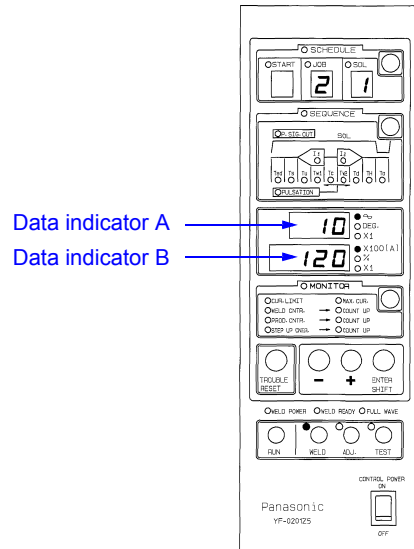
Welding conditions (see "10. Data sheet") can be set by turning on the CONTROL POWER (100VAC). However, to execute operation described in section "4.3 Starting the welding operation" and "4.2.5 Adjustment and Test run", it is necessary to turn on both WELD POWER and CONTROL POWER.

When both power switches are turned on:

- "Data indicator A" indicates software version (3 digits)
- "Data indicator B" indicates software code (4 digits) for about 0.5 second..
- * It is recommended to keep setting data on the data sheet in case of losing data.

Note

When "Memory error" (See "6. Troubleshooting") is displayed, all the setting data are reset to default values (the lowest of the set range). Press the TROUBLE RESET key to clear the display, and then newly set the values. Refer to section "5.2 Checking of set data".



4. 2. 1 Maximum current and trans winding ratio

Operation	Lamp / indicator	Indication										
(1) Selecting the sequence setting mode • Press the MONITOR mode select key.	<table border="1"> <tr><td>•MONITOR lamp:</td><td>ON</td></tr> <tr><td>•CUR. LIMIT lamp:</td><td>ON</td></tr> <tr><td>•JOB lamp:</td><td>ON</td></tr> <tr><td>•Job No. indicator:</td><td>Currently stored job number.</td></tr> </table>	•MONITOR lamp:	ON	•CUR. LIMIT lamp:	ON	•JOB lamp:	ON	•Job No. indicator:	Currently stored job number.			
•MONITOR lamp:	ON											
•CUR. LIMIT lamp:	ON											
•JOB lamp:	ON											
•Job No. indicator:	Currently stored job number.											
(2) Setting the MAX. CUR. • Press the ENTER/SHIFT key until the MAX. CUR. lamp is turned on.	<table border="1"> <tr><td>MAX.CUR lamp:</td><td>ON</td></tr> </table>	MAX.CUR lamp:	ON									
MAX.CUR lamp:	ON											
• Select a number using "+" or "-" key.	<table border="1"> <tr><td>Data indicator B</td><td>New maximum current.</td></tr> </table>	Data indicator B	New maximum current.									
Data indicator B	New maximum current.											
• Press ENTER/SHIFT key	<table border="1"> <tr><td>•MAX.CUR lamp:</td><td>OFF</td></tr> <tr><td>•x100(A)</td><td>OFF</td></tr> <tr><td>•JOB No. indicator:</td><td>Current SOL No.</td></tr> </table>	•MAX.CUR lamp:	OFF	•x100(A)	OFF	•JOB No. indicator:	Current SOL No.					
•MAX.CUR lamp:	OFF											
•x100(A)	OFF											
•JOB No. indicator:	Current SOL No.											
• Select a number using "+" or "-" key.	<table border="1"> <tr><td>Data indicator B</td><td>New maximum current.</td></tr> </table>	Data indicator B	New maximum current.									
Data indicator B	New maximum current.											
<When secondary constant current is selected>	<table border="1"> <tr><td>•CUR. LIMIT lamp:</td><td>ON</td></tr> <tr><td>•JOB lamp:</td><td>ON</td></tr> <tr><td>•Job No. indicator:</td><td>Currently stored job number.</td></tr> </table>	•CUR. LIMIT lamp:	ON	•JOB lamp:	ON	•Job No. indicator:	Currently stored job number.					
•CUR. LIMIT lamp:	ON											
•JOB lamp:	ON											
•Job No. indicator:	Currently stored job number.											
<When primary constant current is selected>	<table border="1"> <tr><td>•CUR. LIMIT lamp:</td><td>ON</td></tr> <tr><td>•x1 (bottom)</td><td>ON</td></tr> <tr><td>•Data indicator B</td><td>Currently stored transformer winding ratio.</td></tr> </table>	•CUR. LIMIT lamp:	ON	•x1 (bottom)	ON	•Data indicator B	Currently stored transformer winding ratio.					
•CUR. LIMIT lamp:	ON											
•x1 (bottom)	ON											
•Data indicator B	Currently stored transformer winding ratio.											
(3) Setting the transformer winding ratio. <Only when primary constant current is selected>	<table border="1"> <tr><td>Data indicator B:</td><td>Selected transformer winding ratio.</td></tr> </table>	Data indicator B:	Selected transformer winding ratio.									
Data indicator B:	Selected transformer winding ratio.											
• Select a number using "+" or "-" key.	<table border="1"> <tr><td>•Data indicator B:</td><td>OFF</td></tr> <tr><td>•"X1" (bottom) lamp:</td><td>OFF</td></tr> <tr><td>•CUR. LIMIT lamp:</td><td>ON</td></tr> <tr><td>•JOB lamp:</td><td>ON</td></tr> <tr><td>•Job No. indicator:</td><td>Currently stored job number.</td></tr> </table>	•Data indicator B:	OFF	•"X1" (bottom) lamp:	OFF	•CUR. LIMIT lamp:	ON	•JOB lamp:	ON	•Job No. indicator:	Currently stored job number.	
•Data indicator B:	OFF											
•"X1" (bottom) lamp:	OFF											
•CUR. LIMIT lamp:	ON											
•JOB lamp:	ON											
•Job No. indicator:	Currently stored job number.											
• Press ENTER/SHIFT key												

4.2.2 Sequence mode

<u>Operation</u>	<u>Lamp / indicator</u>	<u>Indication</u>
(1) Selecting the sequence setting mode • Press the SEQUENCE mode select key.	•SEQUENCE lamp:	ON
	•JOB lamp:	ON
	•Job No. indicator:	"1"
(2) Selecting the job No. • Select a number using "+" or "-" key..... • Press ENTER/SHIFT key.....	Job No. indicator:	Selected number
	•JOB lamp:	OFF
	•SOL lamp:	ON
	•SOL No. indicator:	Current SOL No.
(3) Selecting the SOL No. • Select a number using "+" or "-" key..... • Press ENTER/SHIFT key.....	SOL No. indicator:	Selected number
	•SOL lamp:	OFF
	•SOL No. indicator:	OFF
	<u>When the Pressure control" is ON</u>	
	•P.SIG.OUT lamp:	ON
	•"X1" (upper) lamp:	ON
	•Data indicator A:	Currently stored pressure control output
	<u>When the Pressure control" is OFF</u>	
	•"Tsd" lamp:	ON
	•"∞" lamp:	ON
•Data indicator A:	Currently stored squeeze delay time	
(4) Setting the pressure control output. <When the Pressure control" is ON> • Select a number using "+" or "-" key..... • Press ENTER/SHIFT key.....	Data indicator A:	Selected number
	•P.SIG.OUT lamp:	OFF
	•"X1" (upper) lamp:	OFF
	•"Tsd" lamp:	ON
	•"∞" lamp:	ON
	•Data indicator A:	Currently stored squeeze delay time
(5) Setting the squeeze delay time. • Select a number using "+" or "-" key..... • Press ENTER/SHIFT key.....	Data indicator A:	Selected number
	•"Tsd" lamp:	OFF
	•"Ts" lamp:	ON
(6) Setting the squeeze time. • Select a number using "+" or "-" key..... • Press ENTER/SHIFT key.....	Data indicator A:	Selected number
	•"Ts" lamp:	OFF
	•"Tu" lamp:	ON
(7) Setting the up-slope time. • Select a number using "+" or "-" key.....	Data indicator A:	Currently stored up-slope time
	Data indicator A:	Selected number

Basic operation

Operation

Lamp / indicator

Indication

- Press ENTER/SHIFT key

•“Tu” lamp:	OFF
•“Tw1” lamp:	ON
•Data indicator A:	Currently stored weld time 1

Note

The up-slope time is not included in the weld time 1. Therefore, setting “1” or above as the up-slope time while the weld time is set at “0” causes trouble.

- (8) Setting the weld time 1.

- Select a number using “+” or “-” key.

Data indicator A:	Selected number
-------------------	-----------------

- Press ENTER/SHIFT key

•“Tw1” lamp:	OFF
•“∞” lamp:	OFF
•Data indicator A:	OFF
•“I1” lamp:	ON
•“X100(A)” lamp:	ON
•Data indicator B:	Currently stored welding current 1

- (9) Setting the welding current 1.

- Select a number using “+” or “-” key.

Data indicator B:	Selected number
-------------------	-----------------

- Press ENTER/SHIFT key

•“I1” lamp:	OFF
•“X100 (A)” lamp:	OFF
•Data indicator B:	OFF
•“Tc” lamp:	ON
•“∞” lamp:	ON
•Data indicator A:	Currently stored cooling time

- (10) Setting the cooling time.

- Select a number using “+” or “-” key.

Data indicator A:	Selected number
-------------------	-----------------

- Press ENTER/SHIFT key

•“Tc” lamp:	OFF
•“Tw2” lamp:	ON
•Data indicator A:	Currently stored weld time 2

- (11) Setting the weld time 2.

- Select a number using “+” or “-” key.

Data indicator A:	Selected number
-------------------	-----------------

- Press ENTER/SHIFT key

•“Tw2” lamp:	OFF
•“∞” lamp:	OFF
•Data indicator A:	OFF
•“I2” lamp:	ON
•“X100 (A)” lamp:	ON
•Data indicator B:	Currently stored welding current 2

- (12) Setting the Welding current 2.

- Select a number using “+” or “-” key.

Data indicator B:	Selected number
-------------------	-----------------

- Press ENTER/SHIFT key

•“I2” lamp:	OFF
•“X100 (A)” lamp:	OFF
•Data indicator B:	OFF
•“Td” lamp:	ON
•“∞” lamp:	ON
•Data indicator A:	Currently stored down-slope time

- (13) Setting the down-slope time.

- Select a number using “+” or “-” key.

Data indicator A:	Selected number
-------------------	-----------------

Operation	Lamp / indicator	Indication
-----------	------------------	------------

<ul style="list-style-type: none"> • Press ENTER/SHIFT key..... 	•“Td” lamp:	OFF
	•“TH” lamp:	ON
	•“∞” lamp:	Remains ON
	•Data indicator A:	Currently stored hold time

Note
 The down-slope time is not included in the hold time.
 Therefore, setting “1” or above as the down-slope time
 while the hold time is set at “0” causes trouble.

(14) Setting the hold time.

<ul style="list-style-type: none"> • Select a number using “+” or “-” key..... 	Data indicator A:	Selected number	
	• Press ENTER/SHIFT key.....	•“TH” lamp:	OFF
		•“To” lamp:	ON
		•Data indicator A:	Currently stored off time

(15) Setting the off time.

<ul style="list-style-type: none"> • Select a number using “+” or “-” key..... 	Data indicator A:	Selected number
	<ul style="list-style-type: none"> • Press ENTER/SHIFT key..... 	•“To” lamp:
•“∞” lamp:		OFF
•PULSATION lamp:		ON
•“X1” (upper) lamp:		ON
•Data indicator A:		Currently stored number of pulsations

(16) Setting the number of pulsations.

<ul style="list-style-type: none"> • Select a number using “+” or “-” key..... 	Data indicator A:	Selected number
	<ul style="list-style-type: none"> • Press ENTER/SHIFT key..... 	•PULSATION lamp:
•“X1” (upper) lamp:		OFF
•Data indicator A:		OFF
JOB lamp:		ON
•Job No. indicator:		Currently selected job No.

4. 2. 3 Schedule mode

In case start mode is set to “4-schedule”, refer to the following procedure to allocate a welding condition number to each start input.

Note

For “15-schedule” start mode, it is not necessary to allocate welding condition, as combination of the start inputs directly specify a welding condition. For details, please refer to section “ Advanced functions”.

<u>Operation</u>	<u>Lamp / indicator</u>	<u>Indication</u>	
(1) Selecting the Schedule mode • Press the SCHEDULE mode select key.	•JOB lamp:	ON	
	•START lamp:	ON	
	•Start No. indicator:	“1”	
(2) Selecting the job No. for “START I” • Press ENTER/SHIFT key • Select a number using “+” or “-” key. • Press ENTER/SHIFT key	•START lamp:	OFF	
	•JOB lamp:	ON	
	•Job No. indicator:	Currently stored job number.	
	Job No. indicator:	Selected number	
	•JOB lamp:	OFF	
	•Job No. indicator:	OFF	
	•START lamp:	ON	
	(3) Selecting the job No. for “START II” • Press “+” • Press ENTER/SHIFT key • Select a number using “+” or “-” key. • Press ENTER/SHIFT key	•Start No. indicator:	“2”
		•START lamp:	OFF
		•JOB lamp:	ON
•Job No. indicator:		Currently stored job number.	
Job No. indicator:		Selected number	
•JOB lamp:		OFF	
•Job No. indicator:		OFF	
•START lamp:		ON	

* Repeat the procedure (3) to select the job numbers for Start III and Start IV.

4.2.4 Monitor mode

<u>Operation</u>	<u>Lamp / indicator</u>	<u>Indication</u>
(1) Selecting the monitor mode • Press the MONITOR mode select key.	•MONITOR lamp:	ON
	•CUR.LIMIT lamp:	ON
	•JOB lamp:	ON
	•Job No. indicator:	Currently stored job number.
(2) Selecting the job No. • Select a number using “+” or “-” key..... • Press ENTER/SHIFT key.....	Job No. indicator:	Selected number
	•JOB lamp:	OFF
	•”%” lamp:	ON
	•Data indicator A:	“U”
	•Data indicator B:	Currently stored current upper limit (%)
(3) Setting the current upper limit (%) • Select a number using “+” or “-” key..... • Press ENTER/SHIFT key.....	Data indicator B:	Selected number
	•Data indicator A:	“L”
	•Data indicator B:	Currently stored current lower limit (%)
(4) Setting the current lower limit (%) • Select a number using “+” or “-” key..... • Press ENTER/SHIFT key.....	Data indicator B:	Selected number
	•CUR.LIMIT lamp:	OFF
	•Job No. indicator:	OFF
	•”%” lamp:	OFF
	•Data indicators A, B:	OFF
	•SOL lamp:	ON
	•SOL No. indicator:	Currently stored SOL number
	•WELD CNTR. lamp:	ON
(5) Selecting the SOL No. • Select a number using “+” or “-” key..... • Press ENTER/SHIFT key.....	SOL No. indicator:	Selected number
	•SOL lamp:	OFF
	•”X1” (upper) lamp:	ON
	•Data indicator A:	Currently stored welding counter set value.
(6) Setting the welding counter • Select a number using “+” or “-” key..... • Press ENTER/SHIFT key.....	Data indicator A:	Selected number
	•WELD CNTR. lamp:	OFF
	•”X1” (upper) lamp:	OFF
	•Data indicator A:	OFF
	•PROD.CNTR. lamp:	ON
	•”X1” (lower) lamp:	ON
	•Data indicator B:	Currently stored production counter set value.

Basic operation

<u>Operation</u>	<u>Lamp / indicator</u>	<u>Indication</u>
(7) Setting the production counter • Select a number using “+” or “-” key.	Data indicator B:	Selected number
	• Press ENTER/SHIFT key	•PROD.CNTR. lamp: OFF •”X1” (lower) lamp: OFF
<When the “Step-up” is selected>	•STEP UP CNTR. lamp:	ON
	•Data indicator A:	“S-0”
	•”%” lamp:	ON
	•Data indicator B:	“0” (The current increment rate for step-up “0”, which is fixed at “0” %.)
(8) Setting the welding counter for step-up “0” (S0) • Press ENTER/SHIFT key	•”%” lamp:	OFF
	•”X1” (lower) lamp:	ON
• Select a number using “+” or “-” key.	Data indicator B:	Currently stored welding counter set value for S0.
	Data indicator B:	Selected number
• Press ENTER/SHIFT key	•”X1” (lower) lamp:	OFF
	•”%” lamp:	ON
• Select a number using “+” or “-” key.	Data indicator A:	“S-1”
	Data indicator B:	Currently stored current incremental rate (%) for step-up “1” (S1)
(9) Setting the current incremental rate for step-up “1” (S1) • Select a number using “+” or “-” key.	Data indicator B:	Selected number
	• Press ENTER/SHIFT key	•”%” lamp: OFF •”X1” (lower) lamp: ON
• Select a number using “+” or “-” key.	Data indicator B:	Currently stored welding counter set value for S1.
	Data indicator B:	Selected number
(10) Setting the welding counter for step-up “1” (S1) • Press ENTER/SHIFT key	•”X1” (lower) lamp:	OFF
	•Data indicator A:	ON
• Select a number using “+” or “-” key.	•”%” lamp:	“S-2”
	Data indicator B:	Currently stored current incremental rate (%) for step-up “2” (S2)
(11) Setting the current incremental rate for step-up “2” (S2) (12) Setting the welding counter for step-up “2” (S2)	•”X1” (lower) lamp:	OFF
	•Data indicator A:	ON
(13) Setting the current incremental rate for step-up “3” (S3) (14) Setting the welding counter for step-up “3” (S3)	•”%” lamp:	“S-2”
	Data indicator B:	Currently stored current incremental rate (%) for step-up “2” (S2)
(15) Setting the current incremental rate for step-up “4” (S4) (16) Setting the welding counter for step-up “4” (S4)	•STEP UP CNTR. lamp:	OFF
	•”X1” (lower) lamp:	OFF
	•Data indicator A:	OFF

As for procedures (11) to (16), refer to the above procedures (9) and (10) and panel indications to complete those settings.

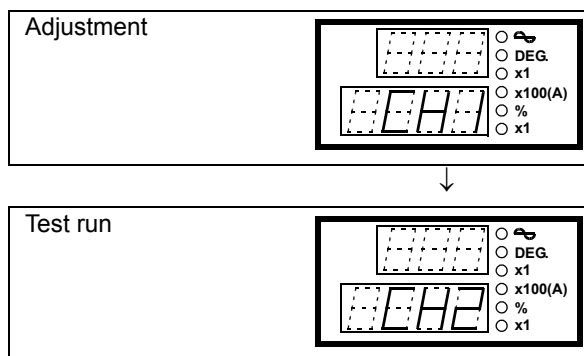
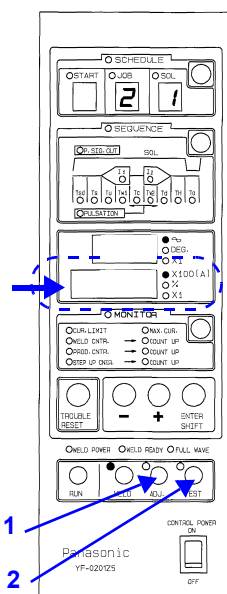
4.2.5 Adjustment and Test run

(1) Adjustment

- Press “ADJ.” key, then “CH1” is displayed on the “Data indicator B”.
- Pressure is being applied while the foot switch is kept on.

(2) Test run

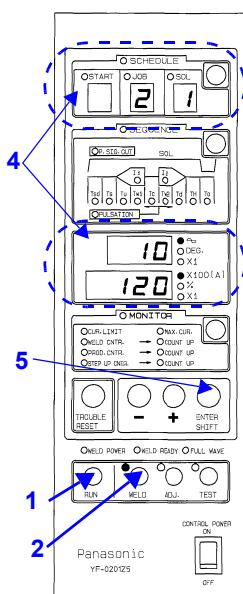
- Press “TEST” key, then “CH2” is displayed on the “Data indicator B”.
- Turn on the foot switch to execute a series of welding sequence without applying welding current.



4.3 Starting the welding operation

Prior to operation, completion of welding conditions settings.

- (1) Press RUN key.
- (2) Press WELD key
- (3) Turn ON the foot switch.
- (4) After completion of welding, indicators show welding results. The welding results shown in the figure are,
 - Job No.: 2
 - SOL No.: 1
 - Welding current 1: 10 cycles, 12,000 A
- (5) It is possible to change display indication by pressing the ENTER/SHIFT key. See “Switching display indication” for the order of indication change.



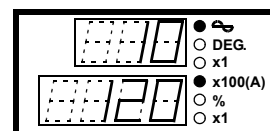
Note

Do not turn off the “CONTROL POWER” while “START” input is in ON state. (If this occurred, turn ON the CONTROL POWER within 24 hours.) If this occurred, counter values of monitoring items (welding count, production count and step up count) are reset to the values before turning on the start input, therefore, indicators do not indicate the actual values, which is not treated as an error.

Switching display indication

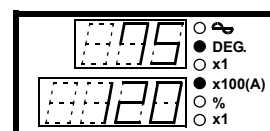
<Initial display>

- Welding cycle
- Welding current



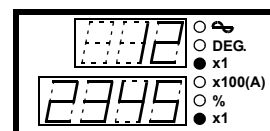
<Press “ENTER/SHIFT” key>

- Conduction angle
- Welding current



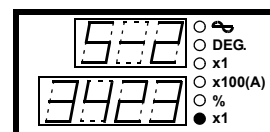
<Press “ENTER/SHIFT” key>

- Welding count
- Number of production




<Press “ENTER/SHIFT” key>

- Number of step-ups
- Remaining welding count



<Press “ENTER/SHIFT” key> to return to the initial display.

5. Maintenance and inspection



	WARNING	Prior to connection work, turn off power to the line disconnect device and all input power, or serious injury, such as electrical shock or burn, may occur.
---	----------------	---

Note	Make sure that only qualified persons or persons who are familiar with welding machines take case of the maintenance and inspection work.
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Daily inspection is inevitable to make the best use of the features of this product and to secure safe operation. Daily inspection includes the following parts, and also cleaning or parts replacement if necessary. As replacement

parts, it is recommended to use Panasonic genuine welding parts in order to maintain performance and mechanism.

5.1 Welding current adjustment

	WARNING	Touching any current-carrying parts may cause a fatal electric shock or burn injury To prevent a fatal accident, such as an electric shock, burn injury, etc., make sure to observe the followings.
		Make sure to turn off the power switch and the switch of the distribution box before removing the top cover of this product.

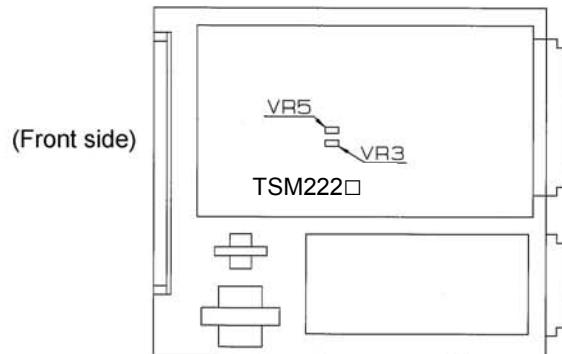
The attached toroidal coil and this product are adjusted as a set to measure current. In case of using a toroidal coil other than the provided one, it is necessary to calibrate the measured current.

When the provided coil is used, or when the error is $\pm 3\%$ or more compared to the measurement by means of a calibrated ammeter, adjust the adjustment volume (VR3 or VR5) on the PC Board (TSM222*) inside the product until the measurements match.

- Adjust VR3 for the primary constant current system
- Adjust VR5 for the secondary constant current system

Note

This product measures and display the average rms current from the third cycle onward excluding up-slope and down-slope. Please take this point into account in case of calibration by means of an ammeter.



5.2 Checking of set data



- Check if the welding condition set values (see "10. Data sheet") are correct (as intended) at the Check the welding conditions of this product at the prestart inspection.
- If the setting data in the memory contains abnormal value, such as a value that exceeds its set range and the control power switch is turned ON, the error message "Memory error" (see "6. Troubleshooting") is

displayed and all the setting data are reset to default values (the lowest of the set range).

- Prior to redo data settings, cancel the error by pressing the "TROUBLE RESET" key.
- It is recommended to keep setting data on the data sheet (see "10. Data sheet") in case of losing the data.

6. Troubleshooting

Note Make sure that only qualified persons or persons who are familiar with welding machines take case of the maintenance and inspection work.

	WARNING	Touching any current-carrying parts may cause a fatal electric shock or burn injury To prevent a fatal accident, such as an electric shock, burn injury, etc., make sure to observe the followings.
		Make sure to turn off the power switch and the switch of the distribution box before removing the top cover of this product.

Refer to the following table to check the possible cause and treatment for the error. If the indicated treatment does

not work, turn off the power switch and contact sales distributor or Panasonic representatives.

Error	Contents	Time of judgement	Reset / Re-start / Treatment of output signal
[01] Current limit	The actual readout is compared to the set value, and the actual readout is out of the set range. ^(*1) (No detection in the case of voltage compensation.)	At the end of hold time	Treatment for major troubles. (See below for details.)
[02] Full wave	Four consecutive cycles of full wave occurred during welding.		Treatment for minor troubles ^(*2) (Default setting) (Changeable to the treatment for major troubles.)
[03] No welding	When the total of two cycles (in case of the constant current control) and when the total of four cycles (in case of the power voltage compensation) of no welding occurred.	At detection	Treatment for major troubles.
[04] Welding power error	The welding power is cut off during sequence operation.		
[05] SCR short-circuit	Current flows during the initial squeeze time.	At the initial squeeze time	1)Restart impossible. Reset by a reset input.
[06] Tip sticking	When the tip sticking function is selected, and the both upper and lower tips are stuck to work.	At detection	2)No output of the hold end signal.
[07] CT wire cut	When the primary constant current system is selected, and breaking of C.T. wire occurs.	When the starting input is turned on	3)Trouble output.
[08] Toroidal wire cut	When the secondary constant current system is selected, and breaking of toroidal coil occurs.		
[09] Setup error	See the next section for details.		
[10] Memory error	Data that exceeds the data upper/lower limit is stored.	When the control power is turned on.	4)Buzzer goes off.
[11] Sequence stop	When the sequence stop function is selected, and the external sequence stop input it turned off (open).	At detection	
[90] Memory writing error	When writing of data to memory IC is failed. ^(*3)	At detection	1)Restart impossible. Reset by a reset input. 2)Trouble output. 3)Buzzer goes off.

(*1) The current limit is judged by the each average value of the Weld time 1 and 2 excluding the first two cycles.

(*2) Treatment for the minor troubles includes 1) restart to reset and 2) Output of hold end signal.

(*3) The "Memory writing error" does not affect the data, such as welding condition, WELD CNTR. PROD. CNTR and STEP UP CNTR. If the reset input does not cancel the error state, please contact Panasonic representatives.

Troubleshooting

● Setup errors

Error type	Contents
[09-1] Up-slope error	The up-slope time is set while the weld time 1 is set to "0" cycle.
[09-2] Down-slope error	The down-slope time is set while the weld time 2 is set to "0" cycle.
[09-3] Pulsation error	The pulsation time is set while the weld time 2 is set to "0" cycle.
[09-4] Over-current (Note)	Set values of the welding current 1 and 2 exceeds the maximum welding current, or in case of the primary constant current system, values whose the primary current exceeds 1600 A are set as welding current 1 and 2.
[09-5] Step-up setting error	The set value by means of step-up current incremental rate exceeds the maximum current.
[09-6] Data lower limit	The initial squeeze time is set to "3" cycles while the "initial delay time", "up-slope time", "weld time 1", "cooling time", "weld time 2", "down-slope time" and "hold time" are all set to "0" cycle.
[09-7] Tip sticking	Any of the following function is selected together with the tip sticking function. <ul style="list-style-type: none"> • Voltage fluctuation compensation control is selected • Current off is selected • Repetitive welding is selected
[09-8] Re-welding	When the re-welding function is selected, any of the following occurred. <ul style="list-style-type: none"> • Voltage fluctuation compensation control is selected • Current lower limit is not set. • Current off is selected.
[09-9] Current off	When the Current off is selected, the repetition welding is selected.

Note

- This error is not applicable when the "Voltage compensation" is selected.
- The primary constant current system is applied when both "Constant current compensation" and "Primary CT" are selected.

<Examples of trouble code indication >

Trouble code	Data indication
02	Data indicator A 02
	Data indicator B
09-2	Data indicator A 09
	Data indicator B 2

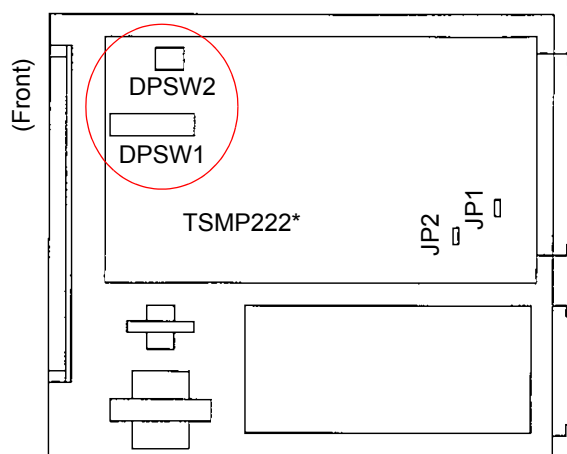
Each indicated number blinks.

7. Advanced functions

7.1 DIP switches (DPSW1, DPSW2) settings

- All the DIP switches are factory set to OFF side at shipment.
- Prior to changing the DIP switch settings, turn off both control power and welding power. Changing the DIP switch settings while those powers are on doesn't update the changes.
- Refer to the following table for description.

Select desirable functions with dip switches on the P.C. board TSMP222*.



DPSW1			
No.	Function	ON	OFF
DPSW1-1	Start mode	15 schedules (Binary code)	4 schedules
DPSW1-2	Control speed ^(*1)	0.5 cycle	1 cycle
DPSW1-3	Trouble mode	Major Trouble	Minor Trouble
DPSW1-4	Start signal is held ^(*2)	at start of sequence	at start of welding
DPSW1-5	Control mode	Voltage fluctuation compensation control	Constant current control
DPSW1-6	Selection of constant current ^(*1)	Primary CT	Secondary troidal
DPSW1-7	Detection of tip sticking	Can be done	Non
DPSW1-8	Re-weld mode	Can be done	Non
DPSW1-9	Selection of current off	Current stop	Sequence stop
DPSW1-10	Mode of increase current	Signal up	Step up

DPSW2			
No.	Function	ON	OFF
DPSW2-1	Pressure Ctrl	Can be done	Non
DPSW2-2	Keep it to OFF at all times		
DPSW2-3	Counter mode	Decrease	Increase

Note

- Turn off "Control Power Switch" before setting DIP switches.
- ^(*1) In case of using this product with
 - A single-phase AC type welder with the primary CT: Set [DPSW1-2] OFF / [DPSW1-6] ON.
 - A single-phase DC type welder: Set [DPSW1-2] ON / [DPSW1-6] ON.
- ^(*2) "Start signal is held" function is to select holding timing.

7.2 Functions

7.2.1 Functions to be set by DPSW1

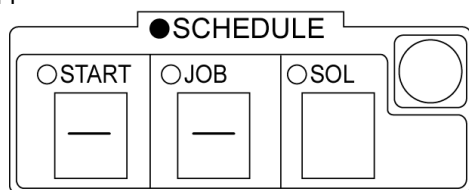
(1) DPSW1-1: Starting mode

- 4-schedule mode: OFF
Inputting the starting input I, II, III or IV activates the welding sequence corresponding to the input. Set the conditions for each starting input in the schedule mode.
- 15-schedule mode: ON
Welding sequence is selected by means of the combination (binary code) of inputs of starting inputs I, II, III and IV.

Welding condition	Starting input			
	I	II	III	IV
1	O			
2		O		
3	O	O		
4			O	
5	O		O	
6		O	O	
7	O	O	O	
8				O
9	O			O
A		O		O
B	O	O		O
C			O	O
D	O		O	O
E		O	O	O
F	O	O	O	O

*The input marked with a circle (O) is set to ON

With the 15-schedule mode, when the schedule mode setting is completed, the following display appears.



(2) DPSW1-2: Control speed

This switch determines the control speed for the secondary constant current control (when DPSW1-5 and DPSW1-6 are OFF). Set this switch to OFF to one cycle response. Set this switch to ON to 0.5 cycle response.

< Note >

- For the primary CT with "Single-AC welding machine", set to OFF side. (one cycle).
- For the primary CT with single-phase DC welding power source, set to ON side (0.5 cycle).

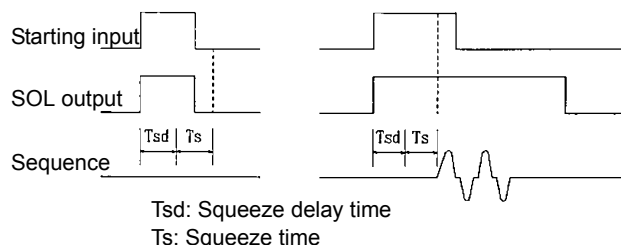
(3) DPSW1-3: Trouble mode

This switch determines if the full wave detection is treated in minor mode or major mode. (The other troubles are treated in the major trouble mode.) Set this switch to OFF for minor mode and ON for major mode.

	Minor trouble	Major trouble
Re-start	Available	-
Hold-end signal	Output	-
Trouble output	-	Available

(4) DPSW1-4: Self-holding

- Self-holding at the start of welding: OFF
If the starting input is turned off before the squeeze time is completed, the solenoid valve is also turned off.



- Self-holding at the start of sequence: ON
Self-holding starts at the same time as starting input is accepted, and the welding sequence continues even if the starting input is turned off. To release self-holding state (in case of emergency), set the DPSW1-9 to OFF side and connect the emergency stop switch to the "Sequence stop/current off" input terminal.

(5) DPSW1-5: Compensating method

- Constant current compensation mode: OFF
In this mode, select either "Secondary toroidal coil" or "Primary C.T." for the "current detecting method (DPSW1-6).
- Voltage compensation mode: ON
In this mode, the current is not monitored if the toroidal coil or C.T is not used. The current is monitored When the toroidal coil is used and the DPSW1-6 is set to OFF (or when the C.T. is used and the DPSW1-6 is set to ON), it monitors the current and detects troubles, specifically the full wave and no current state.

(6) DPSW1-6: Current detecting method

- When this switch is set to OFF, the current is detected by the secondary toroidal coil. Connect the toroidal coil.
- When this switch is set to ON, the current is detected by the primary C.T. Install and connect the specified C.T.

<Note>

In case of using this product to a single-phase AC welding machine with the primary C.T., set the "DPSW1-2" to the OFF (1 cycle) side.

(7) DPSW1-7: Tip stick detection

When this switch is set to ON, the tip stick detection is turned ON. When the SOL output is turned OFF by the completion of welding, SCR is ignited (at an angle of 130°) after 20 cycles (approx. 0.4 sec.) to check if the upper/lower electrodes and the work are stuck. (If tips are stuck, current flows.)

(8) DPSW1-8: Re-welding

When this switch is set to ON and the current lower limit is set (to be set by customers), if welding current below the lower limit flows, after the holding time ends, the sequence is started with the up-slope time to re-weld after 10 cycles while keeping the SOL output ON. However, the re-welding can be performed only once.

(9) DPSW1-9: Current off selection

- In case this switch is set to OFF, when the "Sequence stop/Current off" input terminals are open, the sequence stops and the "Trouble output" outputs.
- In case this switch is set to ON, when the "Sequence stop/Current off" input terminals are open, it goes in "current off" state while keeping the sequence run as usual.

(10) DPSW1-10: Current incremental method

- When this switch is set to OFF (Step-up mode), the welding is performed while increasing the welding current by the preset incremental rate at every welding point.
- When this switch is set to ON (Signal-up mode), the welding is performed while increasing the welding current by the preset incremental rate at every step-up input.

7.2.2 Functions to be set by DPSW2

(1) DPSW2-1: Pressure control

Set this switch to ON when the proportional control valve (optional) is applied.

* In such case, it is necessary to use pressure control unit (YX-ZZ025) (optional).

(2) DPSW2-2: Checking

Make sure to keep this switch OFF. It is the switch for manufacturer's checking.

(3) DPSW2-3: Counter

This switch determines the counting method for welding counter and production counter. Set this switch to OFF to additive method, which displays accumulated welding/production count at the start of operation. Set this switch to ON to subtractive method, which displays remaining welding/production count at the start of operation.

7.3 Welding counter and Production counter

(1) In the setting mode, set the SOL No., and then set welding count and number of products.

(The welding count and the number of products can be set for SOL I and SOL II separately.)

(2) Press "RUN" key and press the "ENTER/SHIFT" key twice, then the welding count and the number of products are displayed on the data indicators A and B.

(3) After that, every time welding is performed, the welding counter is increased by 1.

When the welding counter reaches the preset value,

the welding counter completion output is turned on, the "COUNT UP" lamp of the "WELD CNTR. (MONITOR)" lights, and the buzzer sounds.

(4) At the same time (when the welding counter completion output is turned on), the production counter is increased by 1.

When the production counter reaches the preset value, the production counter completion output is turned on, the "COUNT UP" lamp of the "PROD. CNTR. (MONITOR)" lights, and the buzzer sounds.

Note

- Do not turn off the "CONTROL POWER" while "START" input is in ON state. (If such a thing occurs, turn ON the CONTROL POWER within 24 hours.) **If such a thing occurs, counter values of monitoring items (welding count, production count and step up count) may be different from the actual ones as they are reset to the value before START output is turned on. However, such difference won't be treated as an error.**
- After the welding counter or the production counter reaches the preset value, it is necessary to reset the counter to zero to turn on the next start. To reset, do either one of the followings.
 - Turn on the appropriate reset input.
 - Use front panel keys
 - For welding counter reset:
Press "RUN" and "-" keys together.
 - For production counter reset:
Press "RUN" and "+" keys together.

*If the counter value is changed after it reaches the preset value, the "COUNT UP" lamp is turned off.

- The values displayed as welding and production counter values are the accumulated values. To display remaining values (i.e. the subtractive method), set the DIP swith(DPSW2-3) to the ON side.
- The counters function even if the welding is performed while ∞ and (A) are displayed.
- The counters do not function (do not count) in the "Current off" mode when the product is in the states of test run, current upper or lower limit, full wave (when the major trouble mode is selected), and no current flow.
- When the counters are not required, set "0" to the counter value. (The display for the counters becomes blank.)

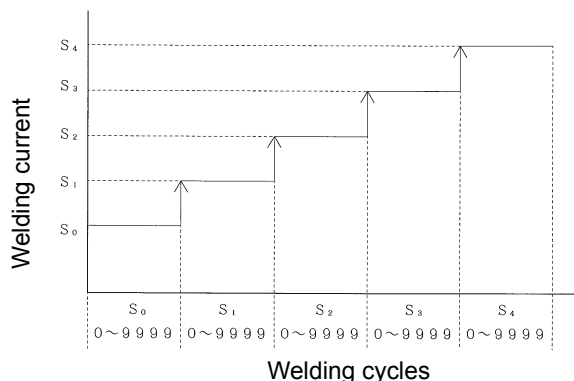
7.4 Step-up

- In the setting mode, set the SOL No., and then set the current incremental rate and welding count for each step. (The set-up conditions can be set for SOL I and SOL II separately.)
- Press "RUN" key and press the "ENTER/SHIFT" key three times, then the current step-up number and the remaining welding count of the relevant step are displayed on the data indicators A and B.
 - After that, every time welding is performed, the welding counter is reduced by 1.
- If the "+" key is pressed in the above (2) state, the current step-up is ended and the operation is shifted to the next step.
- After completion of all welding count preset in S0 to S4, the step-up completion output turned on, the "COUNT UP" lamp of the "STEP-UP CNTR. (MONITOR)" lights, and the buzzer sounds.
 - After that, the operation continues in the step-up 4 (S4) state while maintaining the output until the "Step-up reset input" is turned on or the "step-up shift" input is turned on.

Note

- The counter does not function (do not count) when the product is in no current state, in "Current off" mode and during the test run.
- When this function is not required, set "0" to both the current incremental rate and welding count

<Step-up procedure>



	Welding current
S0	Preset current value
S1	Preset current value x $\left[1 + \frac{S_1U}{100}\right]$
S2	Preset current value x $\left[1 + \frac{S_1U}{100} + \frac{S_2U}{100}\right]$
S3	Preset current value x $\left[1 + \frac{S_1U}{100} + \frac{S_2U}{100} + \frac{S_3U}{100}\right]$
S4	Preset current value x $\left[1 + \frac{S_1U}{100} + \frac{S_2U}{100} + \frac{S_3U}{100} + \frac{S_4U}{100}\right]$

<Note>

- "S1U" to "S4U" indicate the current incremental rate in each step. (0 to 25%)
- As for "S0", the current incremental rate is fixed at 0%.

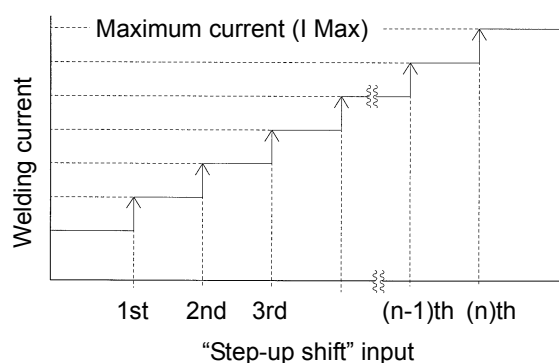
7.5 Signal-up

It is a function to increase the welding current at the preset current incremental rate every time the "Step-up shift" input is given.

This sequence is completed when the welding current reaches or exceeds the maximum current.

- (1) Set the DIP switch DPSW1-10 to ON (selecting "Signal-up").
- (2) In the setting mode, set the SOL No., and then set the current incremental rate. (The set-up conditions can be set for SOL I and SOL II separately.)
- (3) Press "RUN" key and press the "ENTER/SHIFT" key three times, then the current accumulated current incremental rate is displayed.
- (4) When the welding current (based on the accumulated current incremental rate) reaches or exceeds the preset maximum current, the "Signal-up completion output" (the same output as that for the step-up completion) is turned on, the "COUNT UP" lamp of the "STEP-UP CNTR. (MONITOR)" lights, and the buzzer sounds.
 - After that, even if the "step-up shift" input is turned on, the input is ignored and the operation is continued at the maximum current while maintaining the output.
- (5) If the set value for the current incremental rate is changed, during the operation, the newly set incremental rate is added to the current accumulated current incremental rate.

<Signal-up procedure>



	Welding current
0	Preset current value
1	Preset current value $\times \left[1 + \frac{S_u}{100} \right]$
2	Preset current value $\times \left[1 + \frac{S_u}{100} \times 2 \right]$
3	Preset current value $\times \left[1 + \frac{S_u}{100} \times 3 \right]$
⋮	
n-1	Preset current value $\times \left[1 + \frac{S_u}{100} \times (n-1) \right]$
n	Preset current value $\times \left[1 + \frac{S_u}{100} \times n \right]$

<Note>

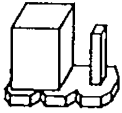
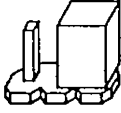
- "Su" indicates set value for the signal-up current incremental rate (0 - 9%).

7.6 Selecting functions

Use JP1, JP2 or DPSW on the PC Board (TSMP222*) to select functions.

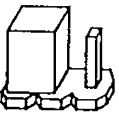
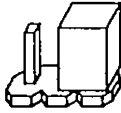
(1) JP1: short plug

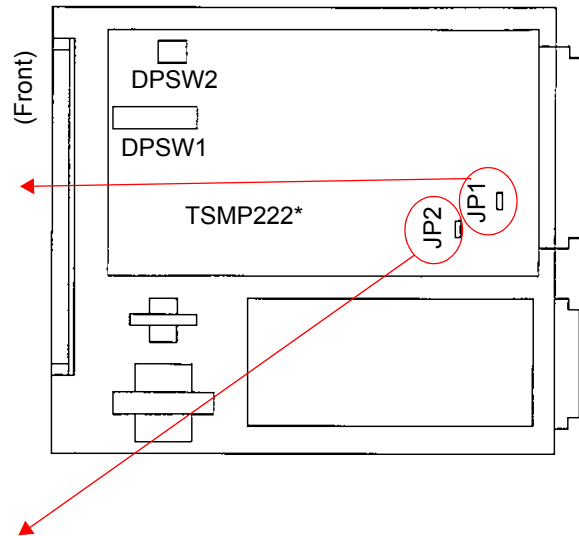
Set to select either “Normally open contact” or “Normally closed contact.” for trouble output

Contact type	Normally open	Normally closed
Setting		
Default setting		-

(2) JP2: Short plug

Set to select either “Production” or “Step-up” counter completion output.

Output type	Production counter completion output	Step-up (or signal-up) counter completion output
Setting		
Default setting		-

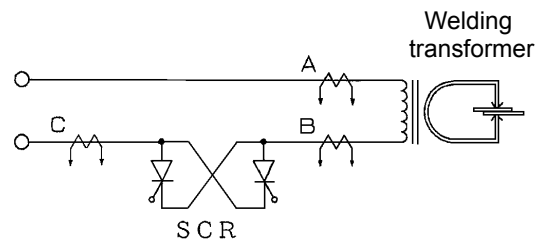


7.7 Installing the specific C.T.

When this product is used with a welding power source that is a primary constant current type or for a single-phase DC type, it is not possible to use the toroidal coil. In that case, it is necessary to use **a specific C.T.** (C.T. with resistor). Depending on model numbers, the C.T. is provided as accessory. (See section “Distinctions”.) If not, please prepare the specified C.T. separately.

1) Install C.T.

- Refer to the figure on the right to install the C.T. to the welding power source.



In case of installing for the first time, install it so that it passes through any one of the cables A, B and C.

2) Set the DPSW1-6 (DIP switch) to the ON (Primary CT) side.

3) Set the DPSW1-2 (DIP switch).

(a)	Primary constant current type welding machine	Set to OFF (1 cycle) side.
(b)	Single-phase DC type welding machine	Set to ON (0.5 cycle) side.

4) Set the transformer winding ratio in the monitor mode.

If the winding ratio is unknown and when installing the CT to a Panasonic welding machine, calculate the winding ratio using the formula on the right and set it.

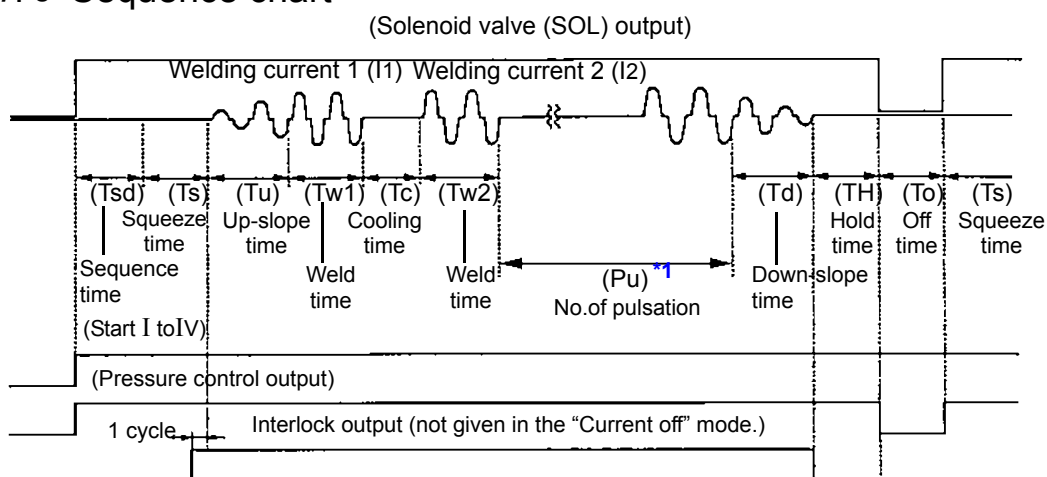
Set the calculated winding ratio and start the welding sequence and correct the winding ratio set value so that the set value and secondary current of the welding machine are equal.

Machine type	Formula
Single-phase AC	$n = I \div (P \times 1000 \div 0.9 \div V)$
Single-phase DC	$n = I \div (P \times 1000 \div 0.85 \div V)$

Where,

- n: Transformer winding ratio
- I(A): Maximum short-circuit current
- P (kVA): Maximum welding input
- V (V): Input voltage

7.8 Sequence chart



- When the hold time ends..... Hold time end output
- When a trouble is detected (at any time)..... Trouble output
- When the welding counter reaches..... the preset value (and after the hold time ends) Welding counter completion output
- When the production counter reaches..... the preset value (and after the hold time ends) Production counter completion output
- When the last step-up ends..... (and after the hold time ends) Step-up completion output
- When the signal-up ends..... (and after the hold time ends) Signal-up completion output

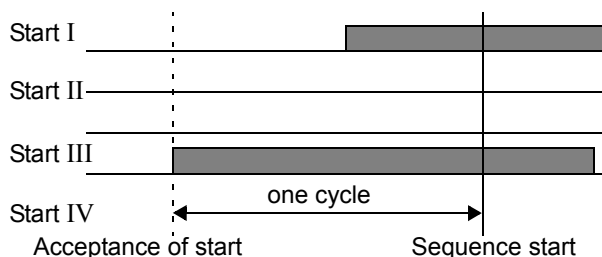
Note *1: The Cooling time (Tc) and Weld time 2 (Tw2) are repeated by the preset number of pulsation (Pu).
 *2: In case of one-spot welding: it goes on for 150 msec after the hold time (TH) ends. However, if the starting input is kept on, it remains in the on state until the starting input is turned off. In case of repeated welding: it is kept on only for the off time (To).

7.9 Timing chart of accepting starting input

The starting input is checked for reconfirm one cycle (welding power frequency) after having received the first starting input.

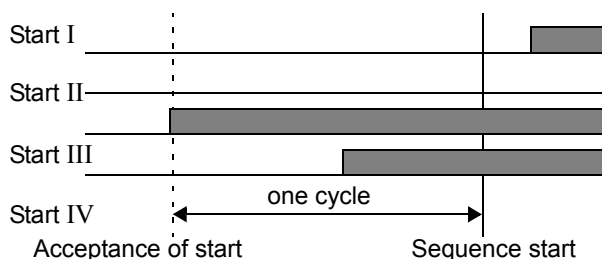
1) 4-schedule mode (DPSW1-1: OFF)

“Start 1” has priority over the others, therefore, the sequence is started with the start 1.



2) 15-schedule mode (DPSW1-1: ON)

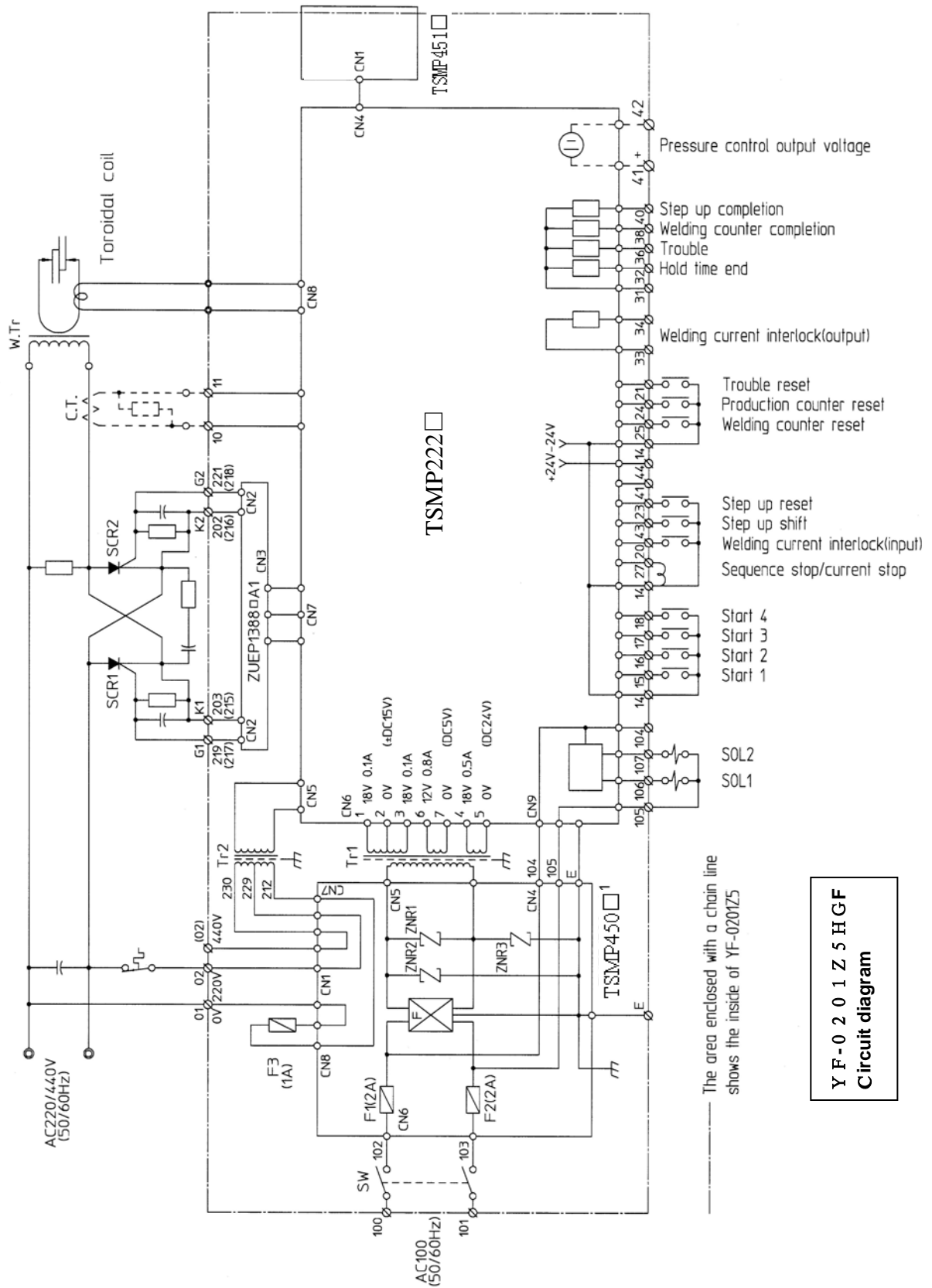
In this case, the “Start 3” and “Start 4” are considered to have been input, therefore, the sequence is started on the welding condition (job No.) C. The “Start 1” is ignored as it occurs after completion of one cycle.



Note

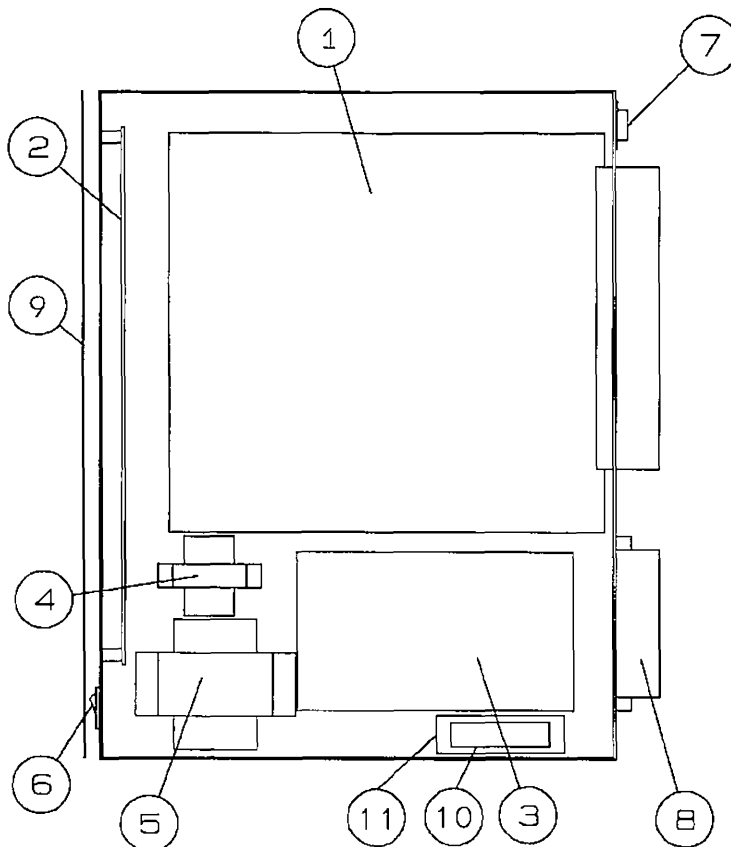
- As for 15-schedule mode, the first starting input is detected in synchronized with the welding power frequency, therefore, (1) it may require two cycles of welding power frequency at most to start the sequence after turning on the start input and (2) all start inputs of the desired job No. need to be input within the one cycle starting from the acceptance of start signal.
- Do not turn off the “CONTROL POWER” while “START” input is in ON state. (If such a thing occurs, turn ON the CONTROL POWER within 24 hours.) If such a thing occurs, counter values of monitoring items (welding count, production count and step up count) may be different from the actual ones as they are reset to the value before START output is turned on. However, such difference won't be treated as an error.

8.Circuit diagram



**YF-0201Z5 HGF
Circuit diagram**

9. Parts list



No.	Name	Part code	Remarks
1	PC Board	TSMP222*	Main control board
2	PC Board	TSMP451*	Indication board
3	PC Board	TSMP450*	Power board
4	Transformer	UTU21430	Control transformer
5	Transformer	UTU21421	Control transformer
6	Switch	DS850S00B	Power switch
7	Socket plug	12-3B	Toroidal coil connecting connector
8	Terminal	TS212PLB8P	
9	Front cover	TSMK0349	
-	Rubber cushion	ME25-6	
-	Terminal block cover	FEK00001	
10	Fuse	RT28-32(R015)	FLQ1: 500V, 1A
11	Fuse holder	RT28N-32	FUNU30

10. Data sheet

10.1 Data sheet 1

					JOB No.													
Set item	Symbol	Unit	Set range	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
SEQUENCE, etc.	SOL output	SOL	SOL I or SOL II															
	Pressure control output	Pr	MPa	0.00 - 0.50														
	Squeeze delay time	Tsd	Cycle	0 - 99														
	Squeeze time	Ts	Cycle	3 - 99														
	Up-slope time	Tu	Cycle	0 - 20														
	Weld time 1	Tw1	Cycle	0 - 99														
	Welding current 1 (Constant current compensation)	I1	A	15 - 500 X100														
	Welding current 1 (Voltage compensation)			0 - 99														
	Cooling time	Tc	Cycle	0 - 99														
	Weld time 2	Tw2	Cycle	0 - 99														
	Welding current 2 (Constant current compensation)	I2	A	15 - 500 X100														
	Welding current 2 (Voltage compensation)			0 - 99														
	Down-slope time	Td	Cycles	0 - 20														
	Hold time	TH	Cycle	0 - 99														
	Off time	To	Cycles	0 - 99 (*1)														
Number of pulsations	Pu	Time	0 - 9 (*2)															
MONITOR	Current upper limit	Iup	%	0 - 20														
	Current lower limit	Idn	%	0 - 20														

(*1): When the "Off time" is set at "0", one-spot welding will be executed, and it is set to "1" or above, repeated welding will be executed.

(*2): When the "Number of pulsations" is "n" (n≠0), the cooling time and weld time 2 are repeated (n+1) times, and the down-slope time occurs only after the (n+1)th weld time 2. When the weld time 2 is set to "0" cycle, it is not possible to set the number of pulsations to "1" or above. (Setting error)

10.2 Data sheet 2

Set item		Symbol	Set range	Data
Monitor	Maximum current	1 Max	50 - 500 (X100A)	
	Welding transformer turn ratio	TR	10.0 - 99.9	

					SOL	
Set item	Symbol	Unit	Set range	SOL I	SOL I	
Counter	Welding counter	Cw	-	0 - 99		
Step-up	Production counter	Cp	-	0 - 9999		
	S0 welding count	0	-	0 - 9999		
	S0 Current incremental rate		-	0 (Fixed)		
	S1 welding count	1	-	0 - 9999		
	S1 Current incremental rate		%	0 - 25		
	S2 welding count	2	-	0 - 9999		
	S2 Current incremental rate		%	0 - 25		
	S3 welding count	3	-	0 - 9999		
	S3 Current incremental rate		%	0 - 25		
	S4 welding count	4	-	0 - 9999		
	S4 Current incremental rate		%	0 - 25		
	Signal-up	Current incremental rate	Su	%	0 - 9	

Set item	Symbol	Set range	Data
Job No. selection	Start I	ST 1	1 - F
	Start II	ST 2	1 - F
	Start III	ST 3	1 - F
	Start IV	ST 4	1 - F

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