Original instructions

INVERTER WELDING POWER SUPPLY

# IPB-5000B EU

# OPERATION MANUAL

AMADA

OM1208566
IPB-5000B-E06-202310

Thank you for purchasing our product.

- For correct use, read this operation manual carefully.
- After reading, save it in a proper place where you can easily access to.

# Contents

**14. Schedule Data Table**



**EU Declaration of Conformity**

# 1. Special Precautions

## (1) Safety Precautions

Before using, read "Safety Precautions" carefully to understand the correct method of use.

- These precautions are shown for safe use of our products and for prevention of damage or injury to operators or others. Be sure to read each of them, since all of them are important for safe operation.
- The meaning of the words and symbols is as follows.

**⚠ DANGER**

Denotes operations and practices that may imminently result in serious injury or loss of life if not correctly followed.

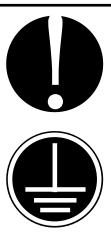
**⚠ WARNING**

Denotes operations and practices that may result in serious injury or loss of life if not correctly followed.

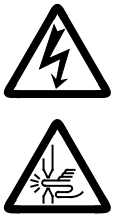
**⚠ CAUTION**

Denotes operations and practices that may result in personal injury or damage to the equipment if not correctly followed.

These symbols denote "prohibition". They are warnings about actions out of the scope of the warranty of the product.



These symbols denote actions which operators must take.



Each symbol with a triangle denotes that the content gives DANGER, WARNING or CAUTION to the operator.

**⚠ DANGER**

**Do not touch the inside of the Power Supply unnecessarily.**

Since very high voltages are charged to the inside of this Power Supply, it is very dangerous to touch it unnecessarily.

Any person other than service personnel, or authorized representatives' personnel must not touch the inside.

**Never disassemble, repair or modify the Power Supply.**

These actions can cause electric shock and fire.

If any part needs to be checked or repaired, contact us or your distributor for help.

**Never burn, destroy, cut, crush or chemically decompose the Power Supply.**

This product incorporates parts containing gallium arsenide (GaAs).

# ⚠ WARNING

**Do not put your hands between the electrodes.**
When welding, keep your fingers and hands away from the electrodes.

**Do not touch any welded part or electrodes during welding and just after welding finished.**
The welded part of a workpiece, electrodes and arm are very hot.
Do not touch them; otherwise you may be burnt.

**Ground the equipment.**
If the Power Supply is not grounded, you may get an electric shock when there is trouble, or when electricity leaks.

**Connect the specified cables securely.**
Cables of insufficient current capacities and loose connections can cause fire and electric shock.

**Do not damage the power cable and connecting cables.**
Do not tread on, twist or tense any cable. The power cable and connecting cables may be broken, and that can cause electric shock and fire.
If any part needs to be repaired or replaced, consult us or your distributor.

**Do not use any damaged power cable, connecting cable and plug.**
That can cause electric shock, short circuits and fire.
If any part needs to be repaired or replaced, consult us or your distributor.

**Stop the operation if any trouble occurs.**
Continuous operation after occurrence of a trouble such as burning smell, abnormal sound, abnormal heat, smoke, etc. can cause electric shock and fire. If such a trouble occurs, immediately consult us or your distributor.

**Persons with pacemakers must stay clear of the welding machine.**
A person who uses a pacemaker must not approach the welding machine or walk around the welding shop while the welding machine is in operation, without being permitted by his/her doctor. The welding machine generates a magnetic field and has effects on the operation of the pacemaker while it is turned on.

**Protective gear must be worn.**
Put on protective gear such as protective gloves, long-sleeve jacket, leather apron, etc. Surface flash and expulsion can burn the skin if they touch the skin.

**Wear protective glasses.**
If you look at the flash directly during welding, your eyes may be damaged. If any Surface flash and expulsion gets in your eye, you may lose your eyesight.

# ⚠ CAUTION

**Apply the specified source voltage.**
Application of a voltage out of the specified range can cause fire and electric shock.

**Do not splash water on the equipment.**
Water splashed over the electric parts, can cause electric shock and short circuits.

**Use proper tools (wire strippers, pressure wire connectors, etc.) for termination of the connecting cables.**
Do not cut the conductor of wire. A flaw on it can cause fire and electric shock.

**Install the equipment on firm and level surface.**
If the equipment falls over or drops from an uneven surface, injury may result.

**Do not sit on or do not put things on it.**
Sitting on it, or putting things on it may cause malfunction.

**Keep combustible matter away from the welding machine.**
Surface flash and expulsion can ignite combustible matter. If it is impossible to remove all combustible matter, cover them with non-combustible material.

**Do not cover this equipment with a blanket, cloth, etc.**
If such a cover is used, it may be overheated and burn.

**Do not use this Power Supply for purposes other than welding.**
Use of this equipment in a manner other than specified can cause electric shock and fire.

**Use ear protectors.**
Loud noises can damage hearing.

**Keep a fire extinguisher nearby.**
Make sure there is a fire extinguisher in or near the welding shop in case of fire.

**Regularly inspect and maintain the equipment.**
Regular inspect and maintenance is essential to safe operation of the equipment. If you see any damage, make necessary before starting the operation.

## (2) Precautions for Handling

- When transporting or moving the Power Supply, do not lay it down. Also, handle the Power Supply with care so as not to make an impact such as drop on it.

- Install the Power Supply on a firm and level surface. If it is used inclined or on its side, it may have a malfunction.
  Also, provide 10 cm clearance to the intake and exhaust for improving the effect of heat release (Refer to **5. (1) Installation**).

- Do not install this Power Supply in the following places:
  - Where there is considerably damp (humidity is higher than 90%).
  - Where the ambient temperature is above 40°C or below 5°C.
  - Where there is nearby high noise source.
  - Where the Power Supply may be exposed to chemicals.
  - Where moisture may be condensed on the surface of the Power Supply.
  - Where there is considerable dirt.
  - Where the Power Supply may be subjected to vibration or impact.
  - Where the altitude is above 1000 meters.

- If the outside of the Power Supply is stained, wipe it with a dry cloth or a moistened cloth. If it is badly stained, use diluted neutral detergent or alcohol to clean it. Do not use paint thinner, benzene, etc., which can discolor or deform the parts.

- Do not put screws, coins, etc., in the Power Supply, as they may cause a malfunction.

- Operate the Power Supply according to the method described in this operation manual.

- Operate the switches and buttons carefully by hand. If they are operated roughly or with the tip of a screwdriver, a pen, etc. they may be broken.

- Operate the switches and buttons one at a time.
  If two or more of them are operated at a time, the Power Supply may have trouble or may be broken.

- The Power Supply is not equipped with auxiliary power such as an outlet for lighting.

- The cable to supply power, the welding head, the welding transformer, and cables for connecting among the welding head, the welding transformer and the Power Supply are separately needed to use the Power Supply.

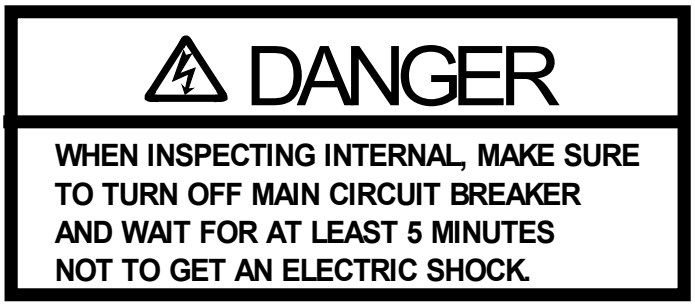
- The I/O signal line to start the Power Supply is not attached. Prepare the crimp-on terminal and line for wiring to the terminal block.

## (3) On Disposal

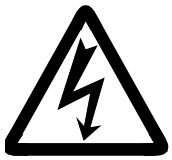
This product incorporates parts containing gallium arsenide (GaAs). At the time of disposal, separate it from general industrial waste or domestic waste and carry out the disposal in accordance with applicable laws and regulations.

## (4) Warning Labels for Safety

The following warning labels are attached to the Power Supply for safe operation. The location of labels and the meaning of the symbols are as follows:




Location: the side surface of a plastic cover inside **IPB-5000B**
Meaning: **Danger**



Location: Output terminal cover inside **IPB-5000B**
Meaning: **Danger of Electrical Shock**

## (5) Function Difference Depending on Model

The function of “only for Model with Displacement Sensor” described in the operation manual is effective for the models equipped with Displacement Sensor as follows.
Other functions are effective for the Models with Sensor as same as the standard models.

| Model | | Welding Power | Sensor Equipped | CE Marking Compliance |
|---|---|---|---|---|
| IPB-5000B | **-00-00** | 200 to 240V AC | × | × |
| | **-00-01** | 380 to 480V AC | × | × |
| | **-00-02** | 380 to 480V AC | × | ○ |
| | **-00-03** | 200 to 240V AC | ○ | × |
| | **-00-04** | 380 to 480V AC | ○ | × |
| | **-00-05** | 380 to 480V AC | ○ | ○ |
| | **-00-07** | 200 to 240V AC | × | × |

○: Applicable ×: Not Applicable

# 2. Features

The **IPB-5000B** is an inverter welding power supply designed for spot welding and fusing.
Because of a compact design, it is easy to move and install. In addition, the monitor function makes possible the judgment of defective or non-defective welding.

- Has a welding current monitoring function for the judgment of weld quality.
- The selection from four control methods of Constant-current control, Constant-voltage control, constant-current/constant-voltage combination control and constant-power control is applicable for realizing the stable weld quality.
- Has an interrupting function (**INTERRUPT**) to interrupt fusing current by externally inputting the displacement of an electrode, etc. for stable fusing.
- Weld current can be stopped when the displacement reaches the set value, because the displacement change between electrodes generated by fusion penetration etc. is measured (only for the model with a displacement sensor).
- As an inverter is used, the power factor is high and the power condition is stabilized.
- Because of the menu selection system, setting of various items can easily be done.
- With four protective functions, the operator can work at ease.
  - Over current detecting function
  - No-current / no-voltage detecting function
  - Thermostat fault detecting function
  - Self diagnostics
- The TFT LCD is employed. You can see monitor values of the welding current etc. clearly from any angle.

# 3. Packaging

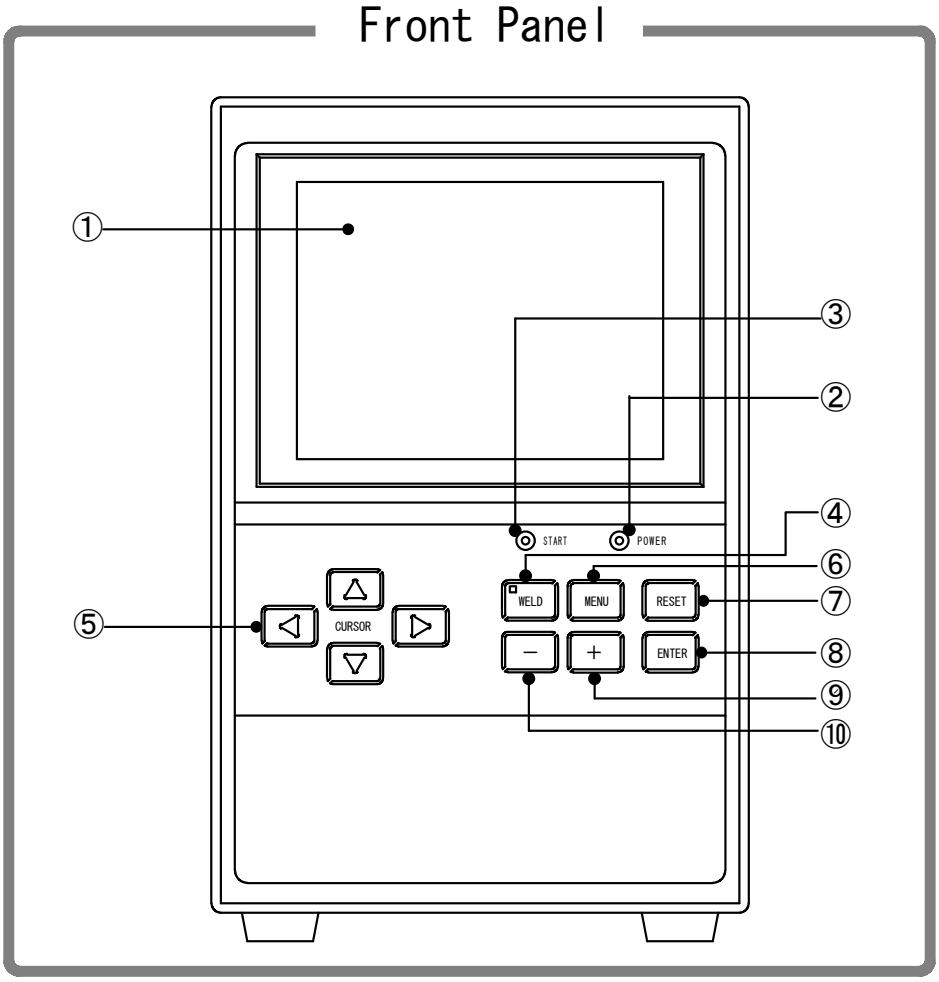
Shipping Kit List

Verify that contents of the container agree with the kit list.
If you see any damage, please contact us.

| Packaged Kit | Quantity |
|---|---|
| **IPB-5000B** | 1 |
| Operation Manual | 1 |
| Cable Clamp (Large)<br>for fixing I/O Cable | 2 |
| Cable Clamp (Small)<br>for fixing I/O Cable | 3 |

# 4. Name and Functions of Each Section

## (1) Front Panel




① **Display Screen**
Displays the information such as setting of a weld schedule, monitored values of weld current, etc.

② **POWER Lamp**
Lights up when the power switch is turned on to supply the power to **IPB-5000B** and **IPB-5000B** works normally.

③ **START Lamp**
Lights up while the start signal is input to make the sequence start.

④ **WELD Key with WELD Lamp**
Use **WELD Key** if you want to make the sequence start without flowing the weld current.
When **WELD Key** is pressed to extinguish **WELD Lamp**, then the weld current does not flow.

⑤ **CURSOR Key**
Moves the cursor upward/downward or to the right/left on **Display Screen**.

⑥ **MENU Key**
Press **MENU Key** to display **MENU Screen**.

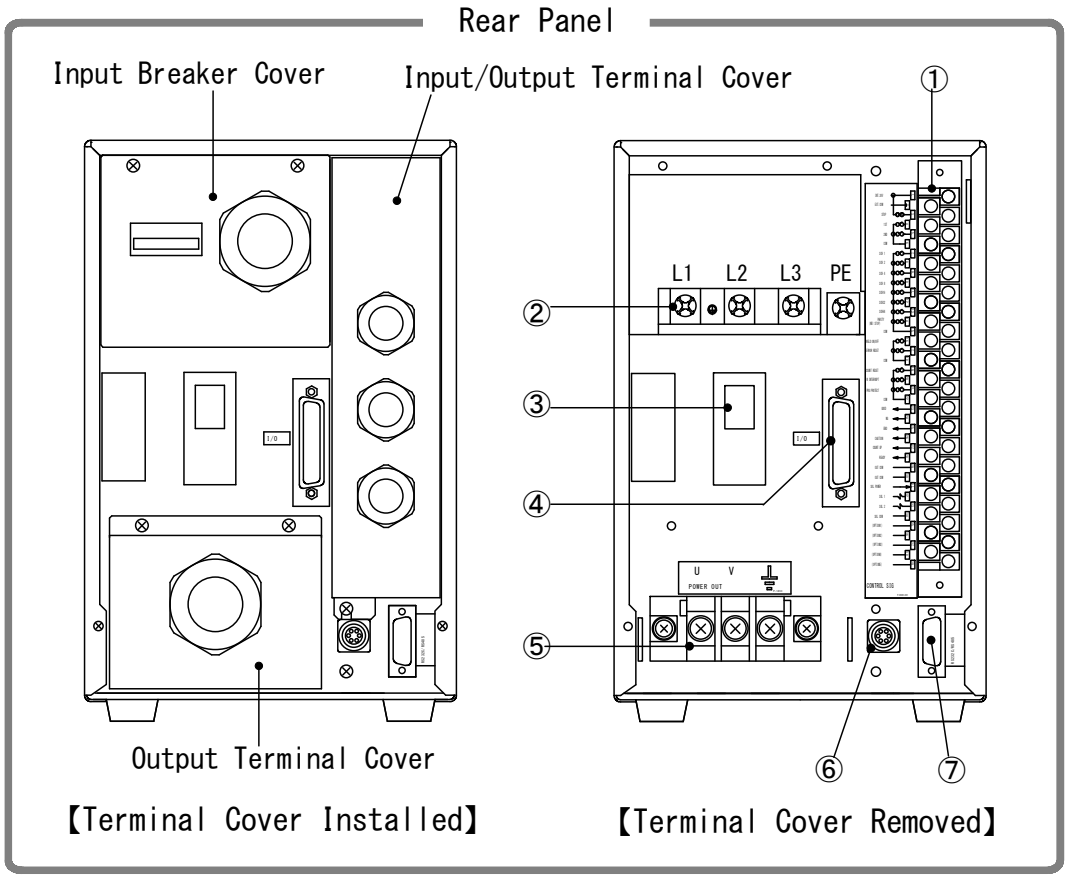
⑦ **RESET Key**
Press **RESET Key** to reset the display of a trouble after removing the cause of the trouble when the trouble display is shown on **Display Screen**.

⑧ **ENTER Key**
Use **ENTER Key** to put in a set value or selected item.
Move the cursor to each item to be changed and press **ENTER Key** item by item to complete the change.

⑨ **+ Key**
Press **+ Key** to increase the value of a changed item.

⑩ **- Key**
Press **- Key** to decrease the value of a changed item.

## (2) Rear Panel




① **Connecting Terminal Strip for External Input/Output Signal**
Used for inputting the schedule signals, outputting trouble signals, etc.
The size of screws is M3.5 for connection.

② **Breaker for Welding Power Input**
Used to accept three-phase power supply for welding.
The size of screws is M5 for connection.

③ **Lever for Welding Power Input Breaker**
Pulling up the Lever supplies power; pushing down disconnects power supply.

④ **Welding Transformer I/O Signal Connector**
Used for connecting [SENS] cable of our welding transformer.

⑤ **Terminal Block for Welding Power Output**
Used for connecting to the input of welding transformer.
The size of screws is M6 for connection.

⑥ **Displacement Sensor Connector**
Used for connecting a displacement sensor (only for the model with displacement sensor).

⑦ **Communication Connector**

Used for communicating with Personal Computer (abbreviated as PC from now) through RS-232C or RS-485.

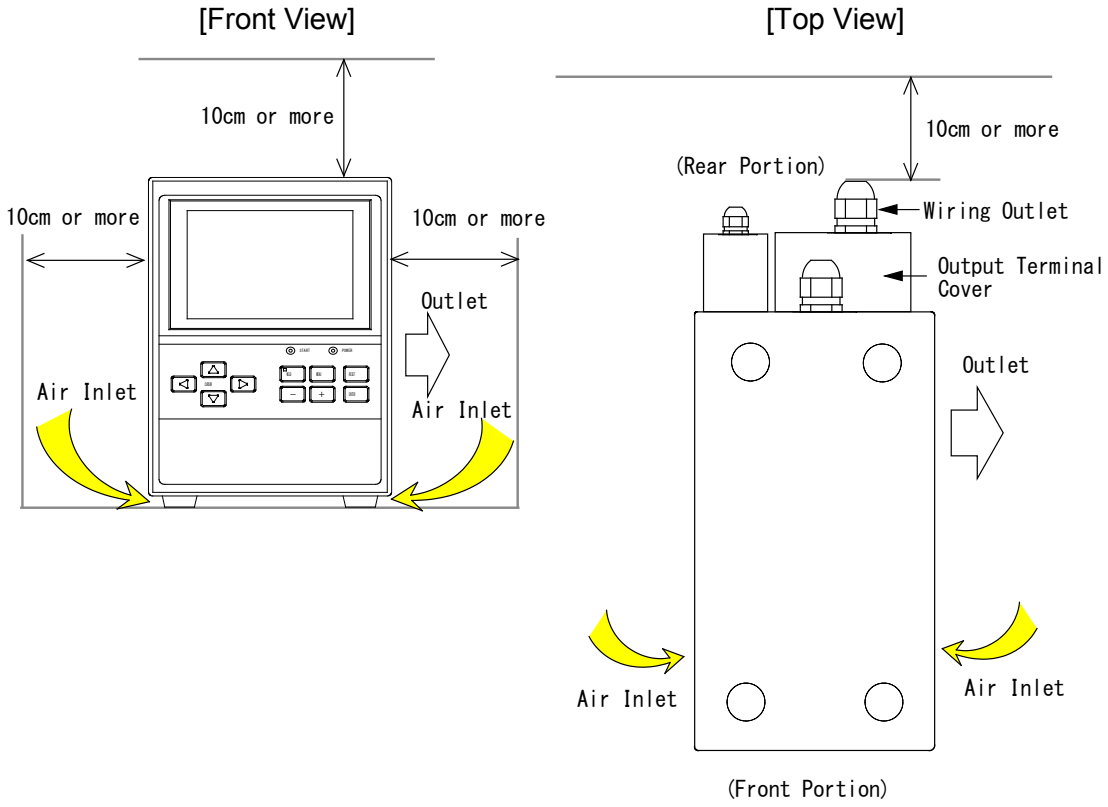
Before coupling with the connector, decide which mode is to be selected, RS-232C or RS-485 and confirm the communication mode. RS-232C is set at the factory shipment.

Mismatching of the communication mode setting at **IPB-5000B** with the mode at PC results in malfunction.

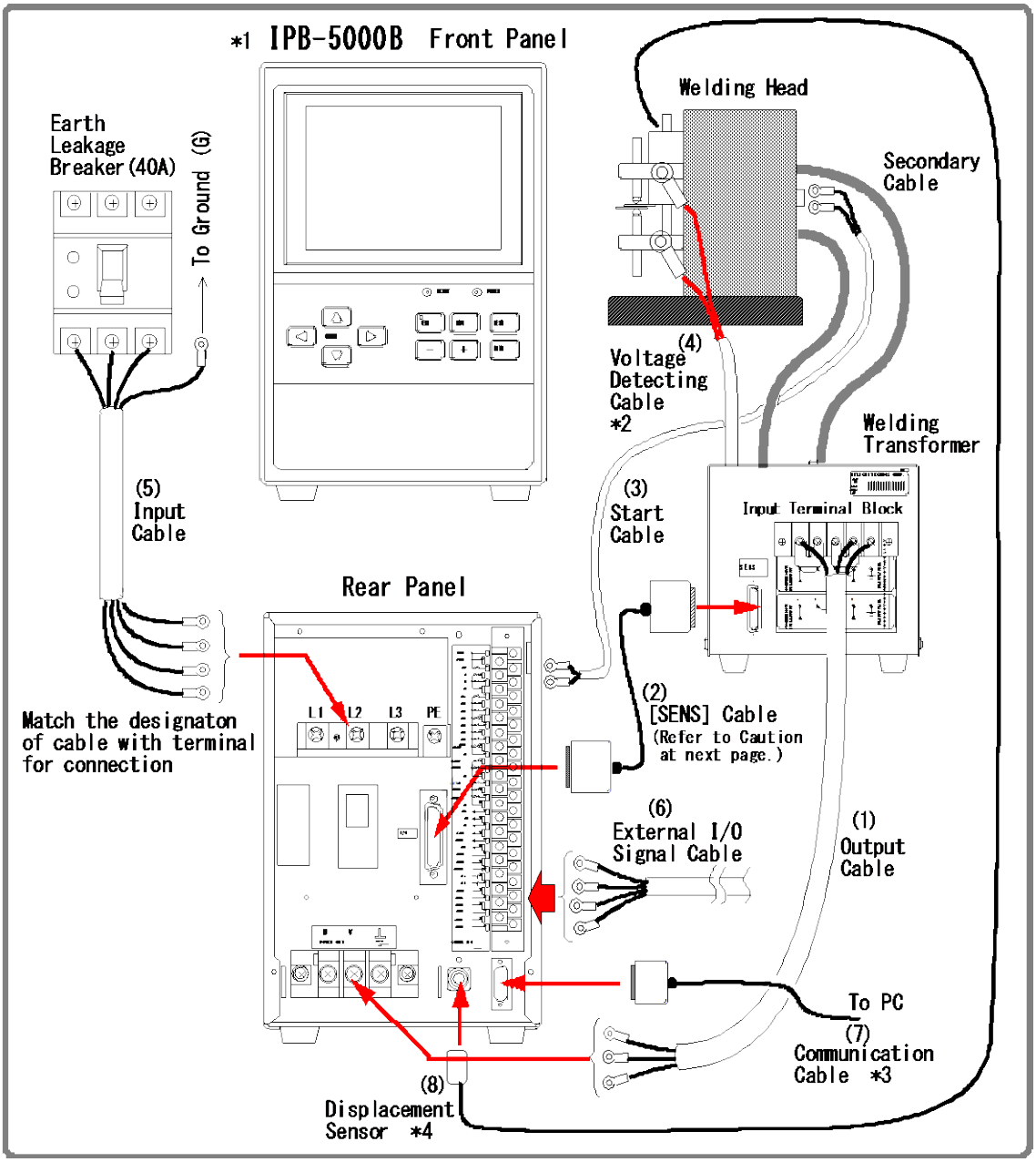
# 5. Installation and Connection

## (1) Installation

When planning for the installation, allow at least the figured clearance on each side from the wall, as referred to the figures below, for improving the effect of heat release.
Allow at least 10 cm or more from the end of the Wiring Outlet projected at the Output Terminal Cover in the rear potion of **IPB-5000B**.
As **IPB-5000B** should be air-cooled, do not install it in a closed area.



## (2) Connection




Numerals of **(1)** to **(8)** in the above figure represent the order of connection procedures in the following pages.

*** 1:** All items are separately sold except **IPB-5000B**.
*** 2:** The Voltage Detecting Cable is used only for Constant Voltage Control, Constant Current/Constant Voltage Combination Control and Constant Power Control.
*** 3:** Communication Cable is used only for connecting Personal Computer (PC).
*** 4:** Displacement Sensor is used only for the model equipped with the Sensor.

**⚠ CAUTION**

Be sure to use **SK-05741** [SENS] cable when connecting **IPB-5000B** with Welding Transformer **IT*-360*6** or **IT*-780*6** (See **11.(2)③** for [SENS] cable).

**⚠ WARNING**

Be sure to ground the equipment.
Be sure to install the Terminal Cover after wiring.

Be sure to install an earth leakage breaker of **40A rated current or more**.

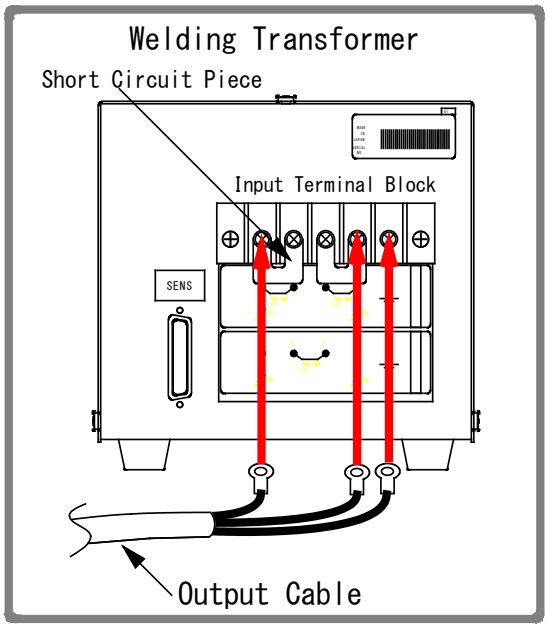
**(1) Connecting Input Terminal Block of transformer.**

Connect the Output Cable from the Input Terminal Block of the welding transformer to the **Terminal block for Welding Power Output** (See **4.(2)⑤**) on the rear panel of **IPB-5000B**.
The ways of connecting the Input Terminal Block of Welding Transformer are different from each other, depending on the input voltage of **IPB-5000B**.
Connect in such way as ① below in the case of 200V System (200 to 240V) and as ② in 400V System (380 to 480V).

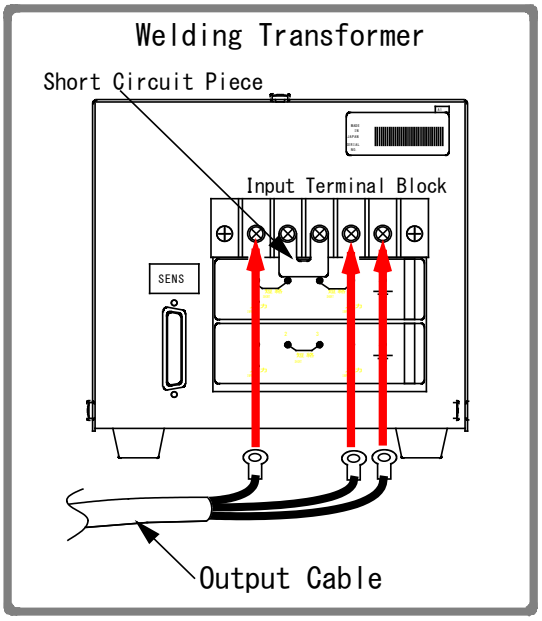
**⚠ CAUTION**

If the connection is done as the figure ① below in the case of **400V System**, it may damage **IPB-5000B** or Welding Transformer.

① **IPB-5000B-00-00** for use (**200V System** Power Supply)




② **IPB-5000B-00-01** for use (**400V System** Power Supply)



**(2) Connecting [SENS] Cable to transformer.**
Connect [SENS] Cable from **Welding Transformer I/O Signal Connector** (See **4.(2)**④) in the rear panel of **IPB-5000B** to Welding Transformer.

**(3) Connecting Start Cable**
Connect Start Cable from **Terminal Strip for External Input/Output Signal** (See **4.(2)**①) in the rear panel of **IPB-5000B** to Terminal Strip for Start Switch in Welding Head.

**(4) Connecting Voltage Detecting Cable**
Connect the Voltage Detecting Cable in the case of using Constant Voltage Control, Constant Current/Constant Voltage Combination Control and Constant Power Control.

**(5) Connecting a power supply**
Connect Input Cable from **Breaker for Welding Power Input** (See **4.(2)**②) in the rear panel of **IPB-5000B** to Earth Leakage Breaker.
Connect the earth cable to **PE** Terminal.

**(6) Connecting a necessary External I/O Signal Cable to Terminal Strip for External Input/Output Signal** (See **4.(2)**①)
Prepare cables for the connection, referring to **8. External Interface**.

**(7) Connecting Communication Cable (only for PC connection)**

The communication with PC can be performed by the use of RS-232C and RS-485.

Before coupling with the connector, decide which mode is to be selected, RS-232C or RS-485 and confirm the communication mode (See **6.(9)②(c) COMM MODE** for the selection of RS-232C and RS-485).

Mismatching of the communication mode setting at **IPB-5000B** with the mode at PC results in malfunction.

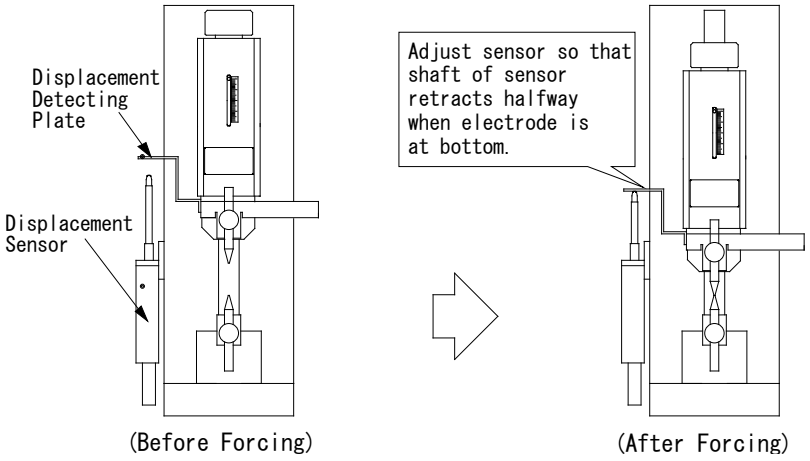
RS-232C is set at the factory shipment.

See **10. External Communication Function** for details.

**(8) Connecting Displacement Sensor (only for model with Sensor)**

Install firmly Displacement Sensor not so as to rattle in reference to the figure below.

Install Displacement Sensor with insulated.

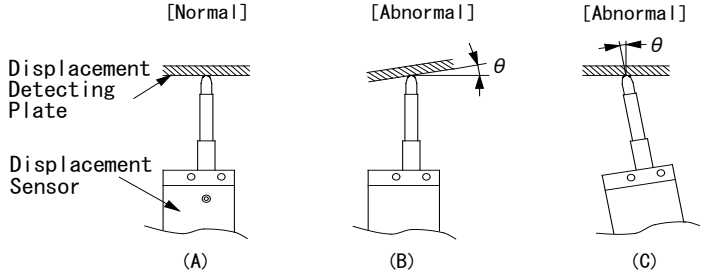



When using the function of detecting a workpiece, adjust the installation position of Sensor for the shaft of sensor so as to retract halfway in the condition before the electrode is forced (left-side figure above).

## ATTENTION

As the figure (A) below, be sure to keep Displacement Sensor perpendicular to Displacement Detecting Plate.

If Displacement Sensor is slantingly installed like (B) or (C), the life of the sensor becomes shorter.

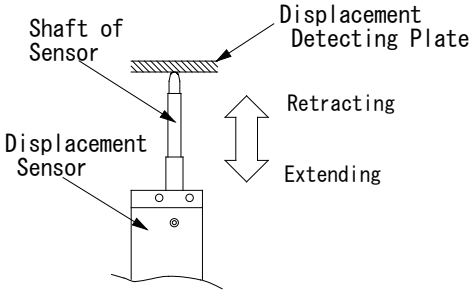



If Sensor is pressed beyond the range of measurement, it results in malfunction.

The measured value of displacement is minus (-) or plus (+).

When NORMAL is selected for DISPLACEMENT POLARITY in the MISC screen, the counted value is plus (+) in the direction of retraction of the movable part of Displacement Sensor and the value is minus (-) in the extension.

On the other hand, when REVERSE is selected, the counted value is minus (-) in the direction of retraction of the movable part of Displacement Sensor and the value is plus (+) in the extension.



# 6. Description of Display Screens

## (1) Operation Flow

An example of the operation for the use of Welding Power Supply is shown as follows:

1. Start up **IPB-5000B**

↓

2. Press **MENU Key** in the front panel to display **MENU Screen**

↓

3. Move the cursor (■) to SCHEDULE Key in **MENU Screen** and press ENTER Key to display SCHEDULE Screen

↓

4. Set each value of the followings
(**SCH #**, **TIME**, **UP SLOPE**, **DOWN SLOPE**, **WE1**, **WE2**, **TR #**)

↓

5. Supply the current for welding (e.g. close Pin No.5 at **External Interface** in **8.(1)①**)

↓

6. Display monitored **CURR**, **VOLT**, **POWER** and **RESI** for verifying weld (See **(4) MONITOR Screen**)

↓

7. Selection of Several Functions

| | | | |
|---|---|---|---|
| Set the upper and lower limit of **CURR**, **VOLT**, **POWER** and **RESIST** for judging Good or No Good of weld<br>(See **(5) COMPARATOR Screen**) | Set Envelope Waveform for judging Good or No Good of weld<br>(See **(6) ENVELOPE Screen**) | Set Weld Time and Control Voltage for Precheck Current Supply<br>(See **(7) PRECHECK Screen**) | Set Weld Stop Function.<br>Set Displacement Check Function.<br>(See **(8) CONTROL Screen**) |

↓

8. Supply the current for welding

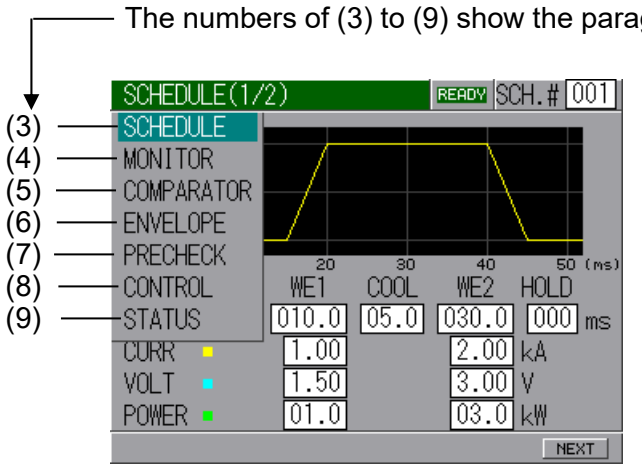
↓

9. Stop **IPB-5000B**

## (2) MENU Screen

| Setting of Values |
| --- |
| Move the cursor ( ) to the number or ON (or OFF) to be set or changed and press **+/- key** to complete such setting as input of a number or change of ON/OFF. |

**IPB-5000B** has various functions, which are set in the respective screens. Press **MENU Key** in Front Panel to display **MENU screen**.
At the upper left of **MENU screen**, each function is displayed as a menu form.
Move the cursor ( ) to an item you desire; press **ENTER key** to go to the selected screen.

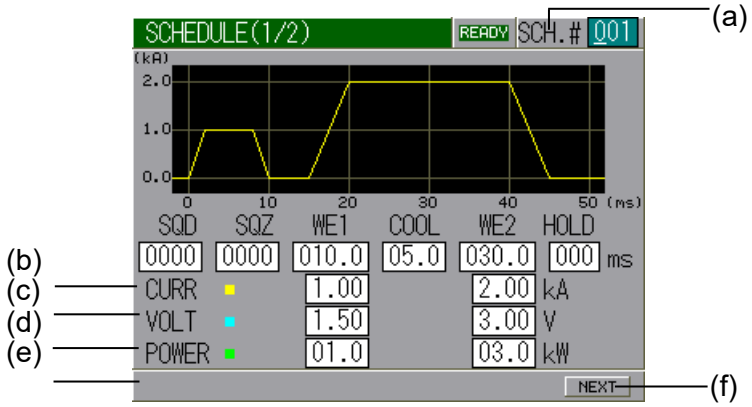



## (3) SCHEDULE Screen

Up to 127 weld schedules can be set on **IPB-5000B**.
Those schedules are indicated as **SCHEDULE #1** to **#127**.
The screen is used to set the **SCHEDULE** No., length of weld time, weld current and so on.

Move the cursor ( ) to **SCHEDULE** and press **ENTER key** to display **SCHEDULE Screen** as follows.
The control method can be set for **WE1** and **WE2** respectively, and the waveform of a selected control method is displayed as follows. Also, if the waveforms selected for each **WE1** and **WE2** are different each other, two different waveforms also are displayed.

### ① Constant Current Control




As the following, each item of **(a)** to **(f)** is described.

**(a) SCH. #**

It denotes No. of weld **SCHEDULE**. 127 weld schedules as **SCHEDULE #1** to **#127** can be set on **IPB-5000B**.

**(b) Time**

Time period of each movement in welding is set at the dimension of ms. Refer to **9. Timing Chart** on the relation of each period.

| | |
|---|---|
| **SQD** / Squeeze Delay Time | Period of time added to the Squeeze Time only once after start-up during repeated operation |
| **SQZ** / Squeeze Time | Period of time until proper squeeze is applied to workpiece |
| **WE1** / Weld 1 Time | The first weld time for which weld current is supplied |
| **COOL** / Cooling Time | Period during which weld current is suspended between **WE1** and **WE2** |
| **WE2** / Weld 2 Time | The second weld time for which weld current is supplied |
| **HOLD** / Hold Time | Period of time to hold workpiece after ceasing weld current |

**(c) CURR** (Note

Indicates the value of current for control. Set it for **WE1** and **WE2** respectively.

**(d) VOLT** (Note

Indicates the value of voltage for control. Set it for **WE1** and **WE2** respectively.

**(e) POWER** (Note

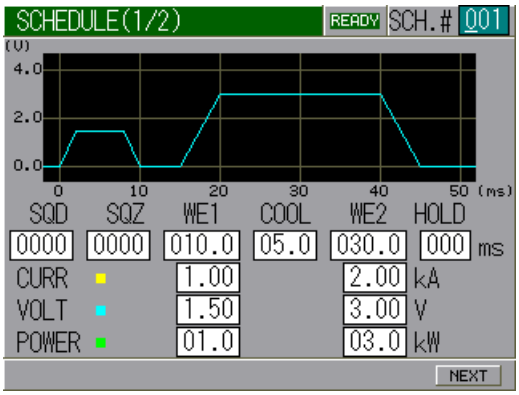
Indicates the value of power for control. Set it for **WE1** and **WE2** respectively.

**(f) NEXT**

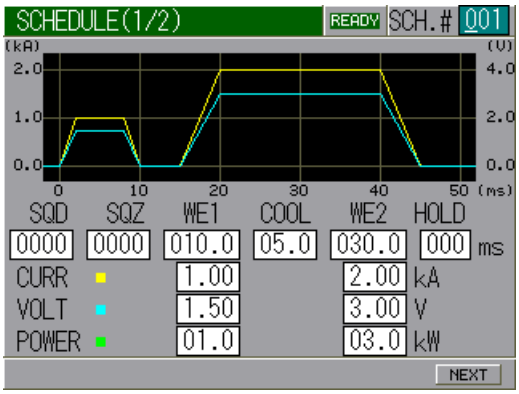
Displays **SCHEDULE (2/2) Screen**.

Note) Even if numbers are input at all the input boxes of control methods, **CURR**, **VOLT** and **POWER**, the numbers other than the selected control method do not work.

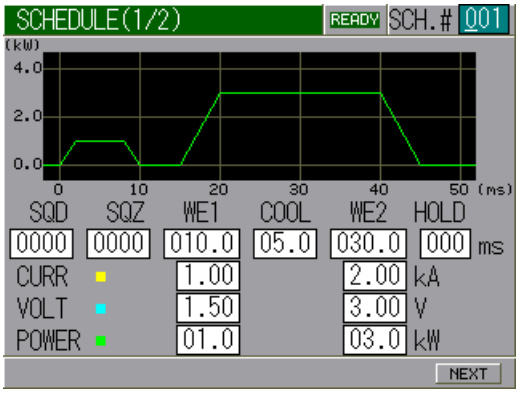
### ② Constant Voltage Control



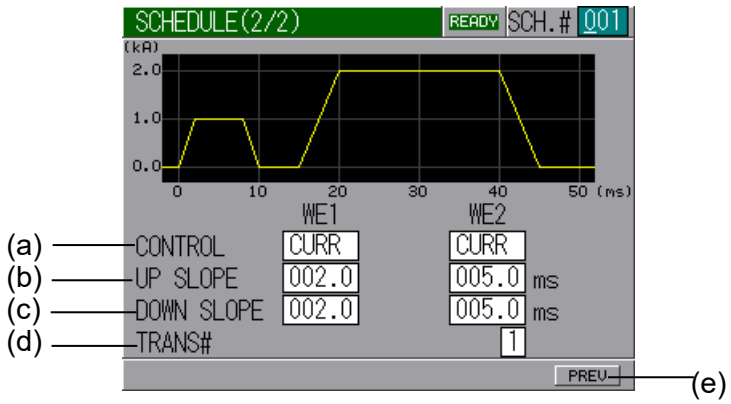

### ③ Constant Current/Constant Voltage Combination Control




### ④ Constant Power Control



### ⑤ SCHEDULE (2/2) Screen




As the following, each item of **(a)** to **(e)** is described.

**(a) CONTROL**

Sets a control method for **WE1** and **WE2** respectively.

**CURR**: Constant Current Control
**VOLT**: Constant Voltage Control
**COMB**: Constant Current/Constant Voltage Combination Control
**POWER-H**: Constant Power Control (**HIGH** Range)
**POWER-L**: Constant Power Control (**LOW** Range)

**(b) UP SLOPE**

Set the upslope time (to increase the weld current gradually) (See **9. Timing Chart**). Set it for **WE1** and **WE2** respectively.

**(c) DOWN SLOPE**

Set the downslope time (to decrease the weld current gradually) (See **9. Timing Chart**). Set it for **WE1** and **WE2** respectively.

**(d) TRANS#**

Indicates the number of a transformer.
Works only at the time when Transformer Selector **MA-650A** is used.

**(e) PREV**

Displays **SCHEDULE (1/2) Screen**.

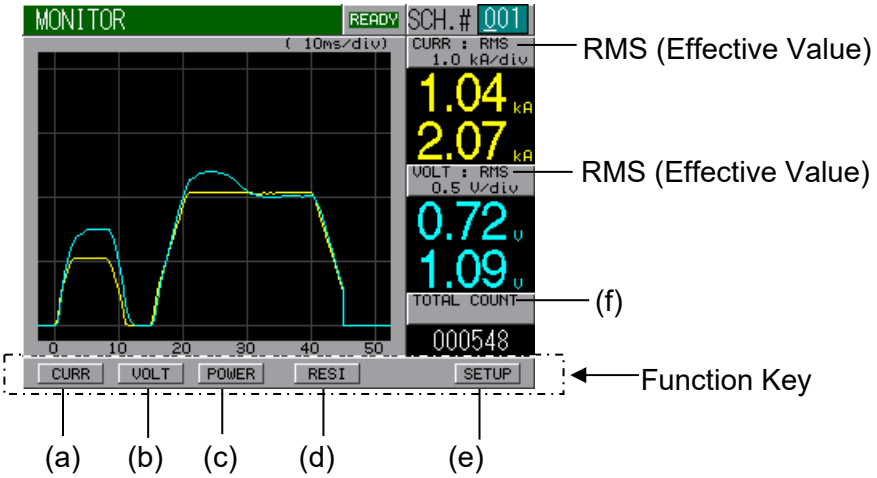
## (4) MONITOR Screen

In this screen, you can confirm the working condition during welding. The monitored data, that is, Current, Voltage, Power and Resistance in every schedule are displayed.

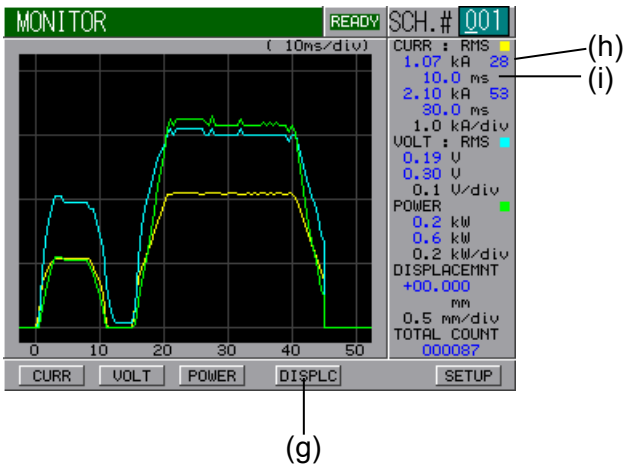
Current is indicated in yellow solid line, Voltage is cyan, Power is green and Resistance is magenta.

Move the cursor ( ) to Function Key (**(a)** to **(f)**) to be selected and press **ENTER Key** to display the desired screen. Press one more time **ENTER Key** to erase the displayed data.

**[When displaying data of two or less]**




**[When displaying data of three or more]**




**(a) CURR**

The waveform of Current can be displayed.

**(b) VOLT**

The waveform of Voltage can be displayed.

**(c) POWER**

The waveform of Power can be displayed.

**(d) RESI**
The waveform of Resistance can be displayed.

**(e) SETUP**
The screen of SETUP can be displayed.

**(f) TOTAL COUNT**
The mode of a counter can be displayed. For details, see **(9)④(e) COUNTER**.

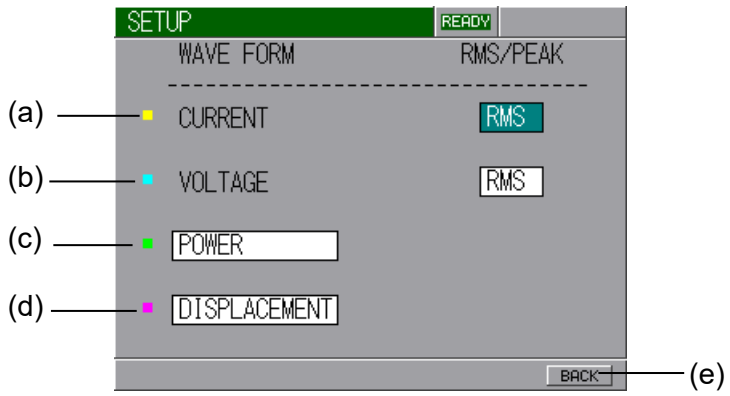
**(g) DISPLC**
The waveform of Displacement can be displayed.
(Only the model equipped with Displacement Sensor works. The waveform is upward displayed in the force-applying direction of Sensor and oppositely, downward in the force-releasing direction.)

**(h) Pulse Width Monitor**
The mean value of pulse widths of the supplied pulse current is displayed in the percentage to 100% of the pulse width at the full wave.
Use **Pulse Width Monitor** as an indication.

**(i) Weld Time**
The period during which weld current is supplied is displayed.

Note) **IPB-5000B** holds the monitored value of all schedules (only the latest one for waveform) while the power is on. When the power is turned off, all values are cleared.

**[SETUP Screen]**




**(a) CURRENT**
Selects **PEAK**/**RMS** of Current Value.

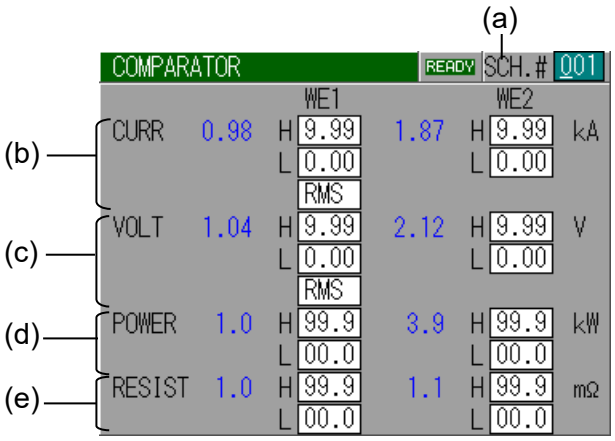
**(b) VOLTAGE**
Selects **PEAK**/**RMS** of Voltage Value.

**(c)**, **(d)**
Selects the waveform to be displayed from 3 types.
**POWER**: Power Waveform
**RESISTANCE**: Resistance Waveform
**DISPLACEMENT**: Displacement Waveform (only for Sensor equipped)

**(e) BACK**
Returns to **MONITOR** Screen.

## (5) COMPARATOR Screen

Set the upper and lower criterion of Current, Voltage, Power and Resistance for judging “Good” or “No Good” weld. If the monitored value is inside the criterion, Good is determined. If it is outside, No Good is determined.
If the monitored value equals to the criterion, Good is determined.
If No Good is determined, an error signal of “NG” or “Caution” is output, so it can be used to activate an alarm buzzer, alarm lamp, and so on.




**(a) SCH. #**

Input the No. of **SCHEDULE** to monitor (Schedule to be set).

**(b) CURR**

Set the upper limit (**H**) and lower limit (**L**) of the weld current for each of **WE1** and **WE2**. The setting range is 0.00 kA to 9.99 kA.
Switching between **PEAK** and **RMS** is possible. If the upper limit (**H**) is set to 9.99 kA and the lower (**L**) to 0.00 kA, no monitoring is done.

**(c) VOLT**

Set the upper limit (**H**) and lower limit (**L**) of the weld voltage for each of **WE1** and **WE2**. The setting range is 0.00 V to 9.99 V.
Switching between **PEAK** and **RMS** is possible. If the upper limit (**H**) is set to 9.99 V and the lower (**L**) to 0.00 V, no monitoring is done.

**(d) POWER**

Set the upper limit (**H**) and lower limit (**L**) of the weld power for each of **WE1** and **WE2**. When **POWER-H** is set for **CONTROL**, the setting range is 00.0 kW to 99.9 kW. If the upper limit (**H**) is set to 99.9 kW and the lower (**L**) to 00.0 kW, no monitoring is done. When **POWER-L** is set for **CONTROL**, the setting range is 0.00 kW to 9.99 kW. If the upper limit (**H**) is set to 9.99 kW and the lower (**L**) to 0.00 kW, no monitoring is done.

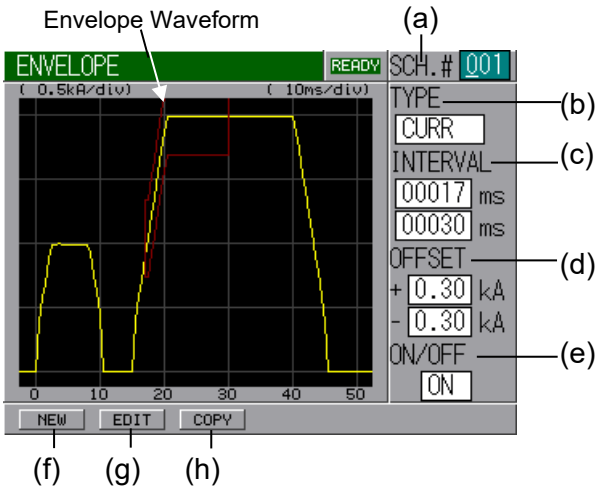
**(e) RESIST**

Set the upper limit (**H**) and lower limit (**L**) of the weld resistance for each of **WE1** and **WE2**. The setting range is 00.0 mΩ to 99.9 mΩ. If the upper limit (**H**) is set to 99.9 mΩ and the lower (**L**) to 00.0 mΩ, no monitoring is done.

Note) **IPB-5000B** holds the monitored value of all schedules (only the latest one for waveform) while the power is on. When the power is turned off, all values are cleared.

## (6) ENVELOPE Screen

Here, the envelope waveform is prepared.
The function of Envelope is to draw a waveform (here, calling Envelope Waveform) having allowable criteria based on a standard waveform (an average actual weld waveform) and compare a monitored actual weld waveform with the Envelope Waveform in order to judge “Good” or “No Good” weld.
If the measured value is inside the Envelope Waveform, “Good” is determined. If it is outside, “No Good” is determined. If the monitored value equals to the Envelope Waveform value, “Good” is determined.
If No Good is determined, an error signal of “NG” or “Caution” is output, so it can be used to activate an alarm buzzer, alarm lamp, and so on.




**(a) SCH. #**

Input No. of **SCHEDULE** to set the schedule.

**(b) TYPE**

Indicates the type of selected standard waveforms, **CURR**, **VOLT**, **POWER**, **RESIST** and **DISPLC**. Only one standard waveform can be selected among the following 8 types of waveform.
When setting the envelope based on the standard waveform from the monitor, flow the current before setting.

| Waveform | How to Select |
|---|---|
| Set Current Waveform | Press **NEW Button**, next press **SCH(C) Button** on the displayed screen. (From now on, the word of **Button** is omitted here.) |
| Set Voltage Waveform | **NEW**, next **SCH(V)** |
| Set Power Waveform | **NEW**, next **SCH(P)** |
| Monitored Current Waveform | **NEW**, next **MON**, next **CURR** |
| Monitored Voltage Waveform | **NEW**, next **MON**, next **VOLT** |
| Monitored Power Waveform | **NEW**, next **MON**, next **POWER** |
| Monitored Resistance Waveform | **NEW**, next **MON**, next **RESIST** |
| Monitored Displacement Waveform | **NEW**, next **MON**, next **DISPLC** (only for model with Displacement Sensor) |

**(c) INTERVAL**

Set the period of Envelope Waveform.

**(d) OFFSET**

Set the upper and lower limit of Envelope Waveform.

**(e) ON/OFF**

Set the activation or inactivation of the function.

**ON:** Envelope function works

**OFF:** Envelope function does not work

**(f) NEW**

Selects a standard waveform.

**(g) EDIT**

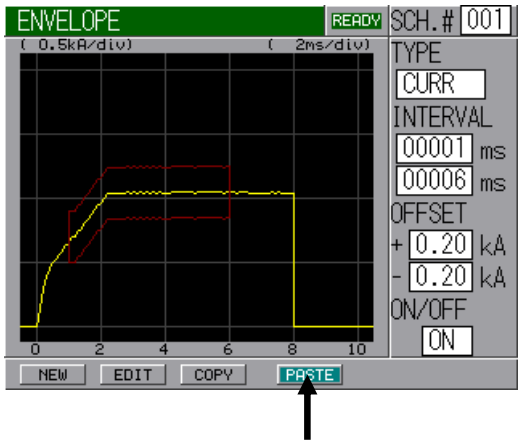
Changes **INTERVAL**, **OFFSET** or **ON/OFF** one another.

**(h) COPY**

Makes a copy of the data of Envelope Waveform.

Move the cursor ( ) to **COPY Button** when **COPY Button** is displayed and press **ENTER Key** to show **PASTE Button**.

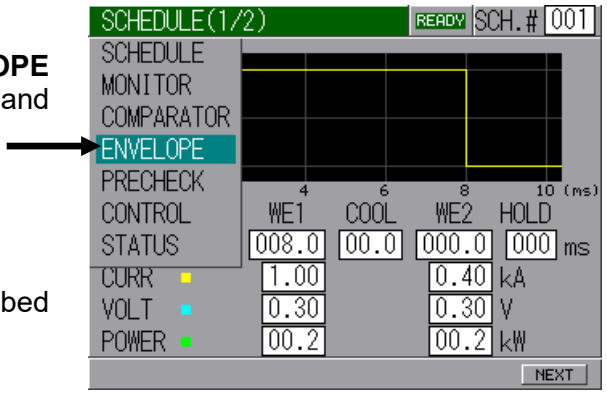
After changing **SCH. #** to be copied (source) into new **SCH. #** to be overwritten (destination), move the cursor ( ) to **PASTE Button** and press **ENTER Key** to copy the data of Envelope Waveform.




**How to Draw Standard Waveform and ENVELOPE Waveform**

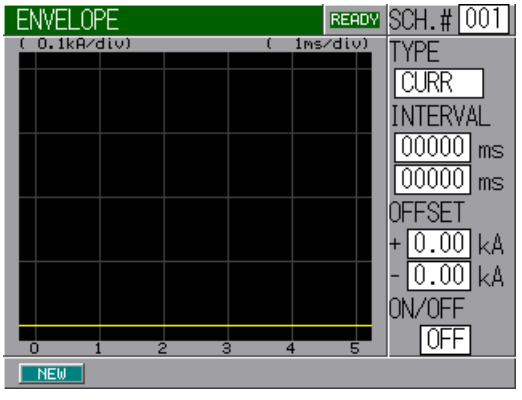
Here, the way how standard waveforms and ENVELOPE waveforms are drawn is described.

① Move the cursor ( ) to **ENVELOPE** on **MENU Screen** (selecting) and press **ENTER Key**.



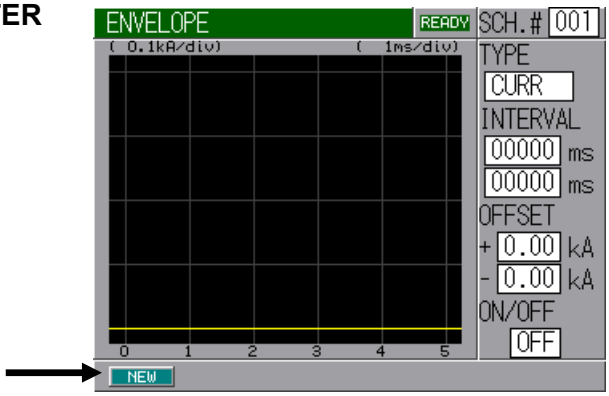

(The right-hand screen is described of Constant Current Control.)

The screen for drawing Envelope Waveform is prepared.

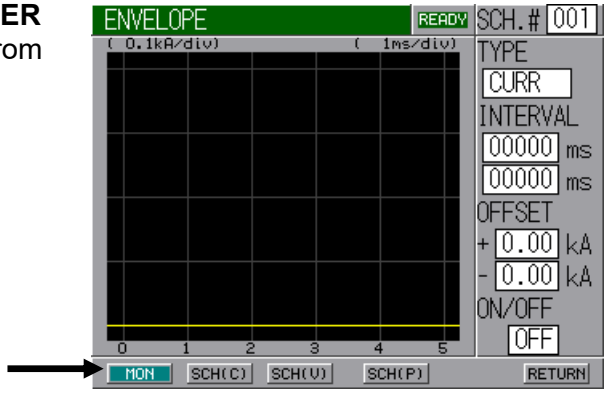



When modifying the existing waveforms, take steps ①, ⑤, ⑥, ⑦ and ⑧ (② to ④ is omitted).

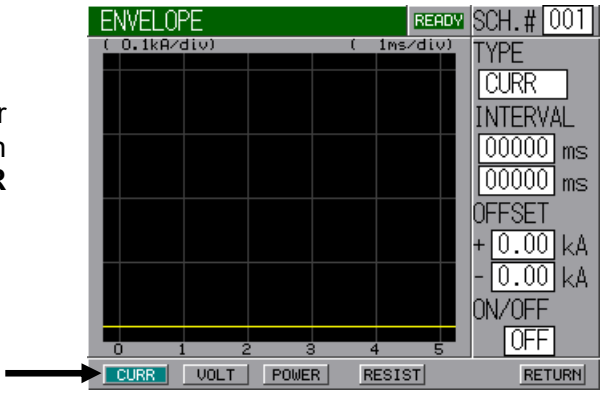
② Select **NEW Button** and press **ENTER Key** to draw a standard waveform.



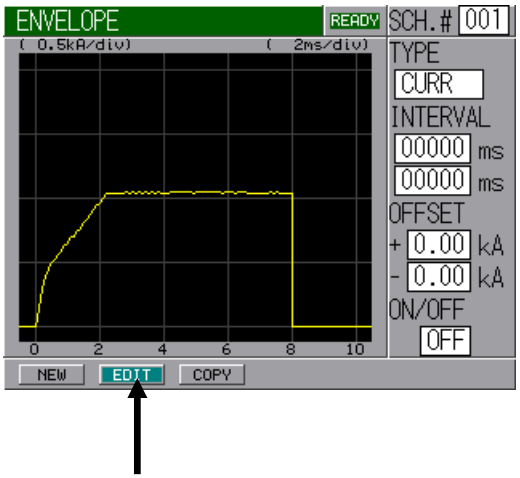

③ Select **MON Button** and press **ENTER Key** to draw a standard waveform from a monitored waveform.



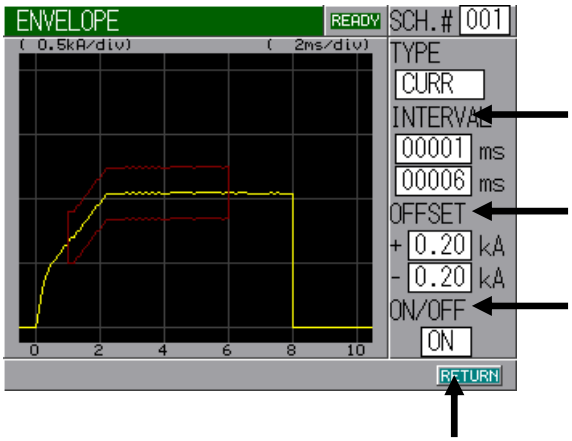

④ Select **CURR Button** and press **ENTER Key** to draw the standard waveform of a current waveform. In the case of Voltage, Power or Resistance, select each button situated on the right side of **CURR button** and press **ENTER Key**.



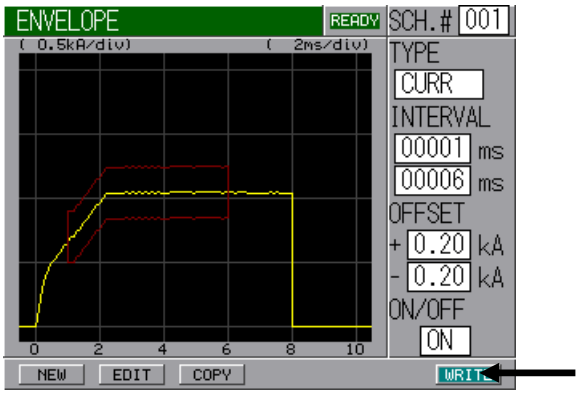

⑤ Select **EDIT Button** and press **ENTER Key** to draw Envelope Waveform.



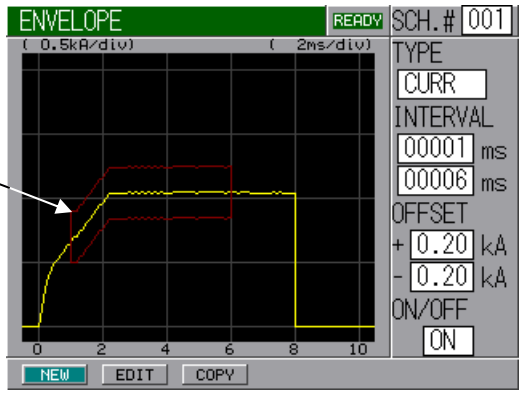
⑥ **INTERVAL** sets the time period from the beginning to end of Envelope waveform.
**OFFSET** sets a plus (+) and minus (-) allowable value.
Concerning **ON/OFF**, **ON** should always be selected when using Envelope function. If OFF is selected, no Envelope function works.
After setting the above items, select **RETURN Button** and press **ENTER Key**.



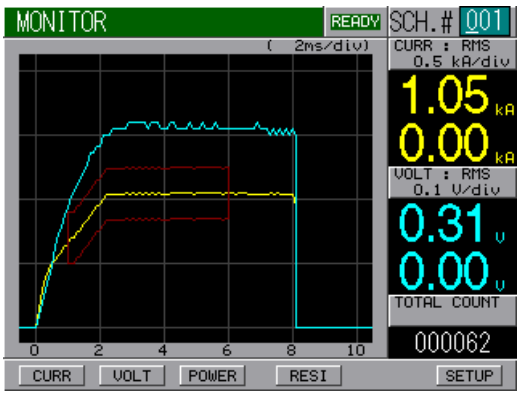

⑦ Select **WRITE Button** and press **ENTER Key** to store the setting.



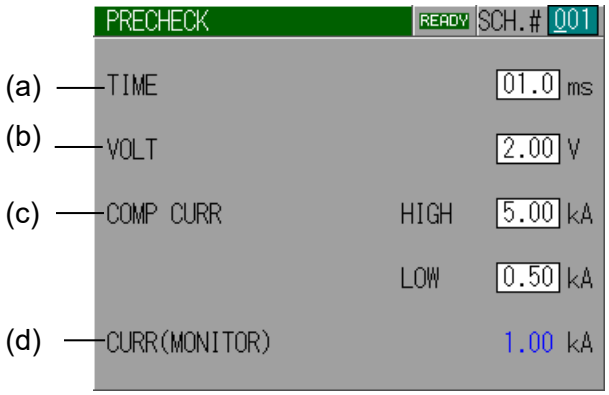

⑧ Here, in this step, Envelope Waveform has been set.




When displaying the monitored screen, Envelope Waveform will appear.



# (7) PRECHECK Screen




Set the period of a weld time and a control voltage for Resistance PRECHECK in this screen.
The function of Resistance PRECHECK is to flow lower current in Constant Voltage Control method just before supplying the weld current and see if workpieces to be welded are correctly positioned by the use of the measured value of current then.

**(a) TIME**
Set a weld time. If the weld time equals to 0.0 ms, no PRECHECK is done.

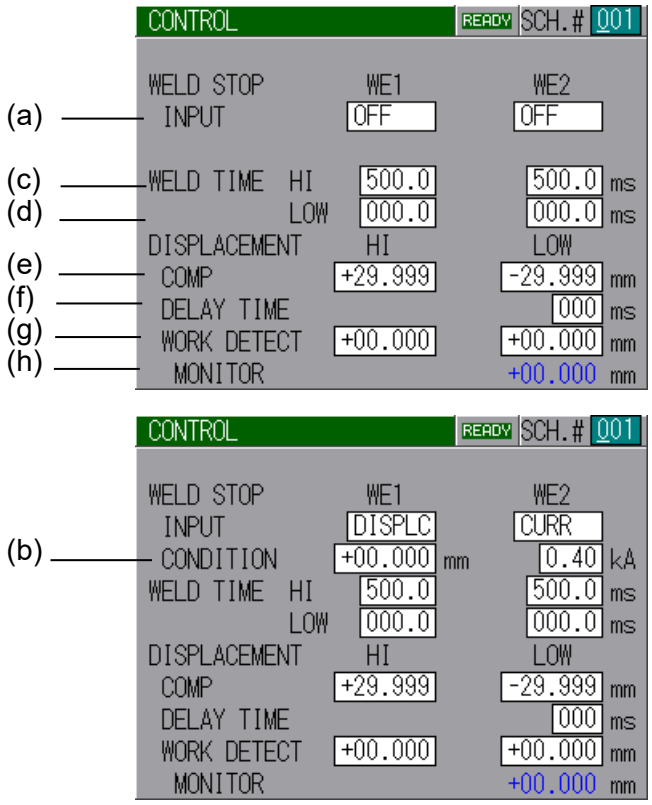
**(b) VOLT**
Set a control voltage.

**(c) COMP CURR HIGH/LOW**
**HIGH:** Set the upper limit of current for PRECHECK.
**LOW:** Set the lower limit of current for PRECHECK.

**(d) CURR (MONITOR)**
Displays the monitored current at PRECHECK current supplying.

Note) **IPB-5000B** holds the monitored value of all schedules (only the latest one for waveform) while the power is on. When the power is turned off, all values are cleared.

# (8) CONTROL Screen




Depict the screens of setting Weld Stop Function, Weld Time Comparator, etc.

**(a) INPUT**

Selects the type of Weld Stops.

**OFF**: External Input, **WE1** Stop Input and Interrupt Input are effective.
**DISPLC**: Weld Stop works at the set displacement value (only for Sensor equipped).
**CURR**: Weld Stop works at the set current value.
**VOLT**: Weld Stop works at the set voltage value.

**(b) CONDITION**

Input the value depending on the setting at **(a)**.

**OFF**: Not displayed. **DISPLC**: Input the value of displacement.
**CURR**: Input current value. **VOLT**: Input voltage value.

**(c) HI**

Input the upper limit of Weld Time.

**(d) LOW**

Input the lower limit of Weld Time.

**(e) COMP**

Input the upper limit (**HI**)/ lower limit (**LOW**) of a final displacement.
(Works only for Model equipped with Displacement Sensor. When using the function of Displacement Sensor, the displacement from Weld Start to the end of **DELAY TIME** is measured to judge the upper and lower limit.)

**(f) DELAY TIME**

Sets **Delay Time**, the time period from Weld Stop to the time when a final displacement is measured (only for Sensor equipped). The setting range is from 0 to the time period of **HOLD TIME** (See **(3)①(b)**).

**(g) WORK DETECT**

Input the upper limit (**HI**) / lower limit (**LOW**) value at the time of detecting workpiece (only for Sensor equipped).

No detection of workpiece is done in the case that “0” is set to both the upper limit and lower limit.

For the detection of workpiece, the position of Sensor where the workpiece is set between electrodes is taken as the base point. The larger displacement without workpiece than the displacement with workpiece is detected to judge whether or not the workpiece is set.

**(h) MONITOR**

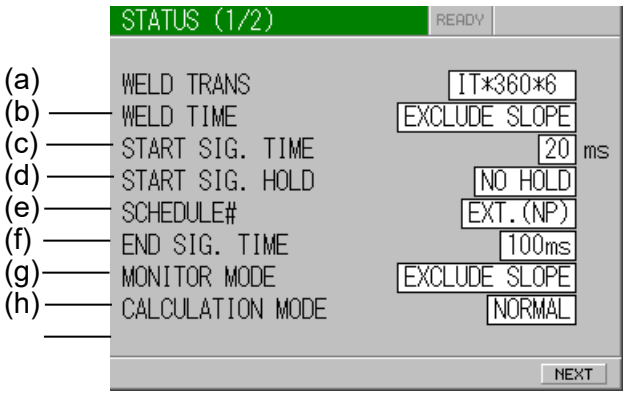
Displays the displacement at the time of detecting workpiece, the time of the end of squeeze time (only for Sensor equipped).

Note) **IPB-5000B** holds the monitored value of all schedules (only the latest one for waveform) while the power is on. When the power is turned off, all values are cleared.

# (9) STATUS Screen

Change the initial setting of **IPB-5000B** here in this screen.
According to customer's preference, precise setting can be obtained.

### ① STATUS (1/2) Screen




**(a) WELD TRANS**

Set a transformer.
Select it between **IT*-360*6** and **IT*-780*6**.
Since **IT*-142*6** is used for adjustment, do not select it.
("*" indicates any letter of the alphabet A to Z.)

**(b) WELD TIME**

Set whether or not upslope/downslope is included in **WELD TIME**.

**EXCLUDE SLOPE:** upslope/downslope is not included
**INCLUDE SLOPE:** upslope/downslope is included

**(c) START SIG. TIME**

Set a delay time defined as the time period which elapses from an input of Start Signal to a beginning of weld sequence.
The setting can eliminate the chattering movement of a start switch.
Select the set value among 20 ms, 10 ms, 5 ms and 1 ms.
If a chattering-proof switch can be used, shortest Delay Time can be obtained.

**(d) START SIG. HOLD**

A self-sustaining timing at starting can be selected.

**SQ HOLD:** Self-sustaining action works from the starting of squeeze sequence
**WE HOLD:** Self-sustaining action works from the starting of weld sequence
**NO HOLD:** NO self-sustaining action works. Input a start signal until the end of sequence.

**(e) SCHEDULE#**

Fixes the method of how to select a schedule.

**EXT. (NP):** Select a schedule by closing a schedule-selecting terminal on Rear Panel

**EXT. (P):** Select a schedule by closing a schedule-selecting terminal and a parity terminal on Rear Panel.

**PANEL:** Select a schedule on Front Panel.

Input a parity signal so that the total number of a closed schedule-selecting terminal and a closed parity terminal may be odd.

**(f) END SIG. TIME**

Set the time period during which End signal or GOOD signal is output.

**10/100ms:** Outputs End signal for 10 ms or 100 ms.

**HOLD:** Outputs End or GOOD signal for the period during which 2ND STAGE terminal is closed. But if it is closed for 10 ms or less, the signals are output for 10 ms. If it is longer than 10 ms, they are output for the closed period of 2ND STAGE terminal.

**(g) MONITOR MODE**

Set the mode of a displayed monitor value.

**EXCLUDE SLOPE:** Slope period not included.

**INCLUDE SLOPE:** Slope period also included.

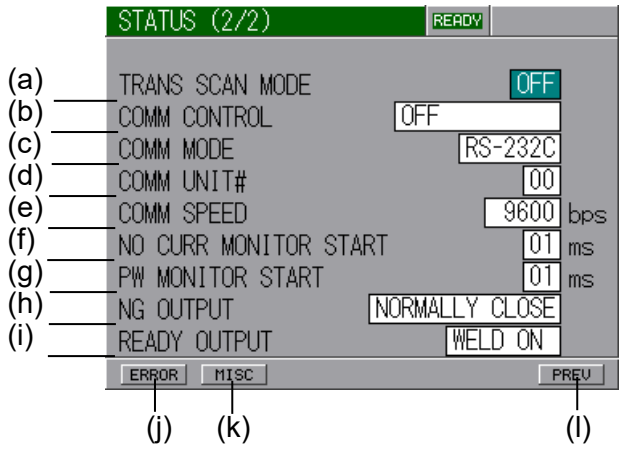
**(h) CALCULATION MODE**

Set the way of calculating a monitored value.

**NORMAL:** Set **NORMAL** usually.

**FAST:** If the takt time is needed to shorten, the shorter calculation time is obtained when **FAST** is set.

### ② STATUS (2/2) Screen




**(a) TRANS SCAN MODE**

Set the scan mode of transformers.
Does not work in Model with Displacement sensor.

**OFF:** No scan mode is used.
**ON:** A **SCHEDULE** is performed.
**1-2:** Consecutive 2 **SCHEDULE**'s are performed.
**1-3:** Consecutive 3 **SCHEDULE**'s are performed.
**1-4:** Consecutive 4 **SCHEDULE**'s are performed.
**1-5:** Consecutive 5 **SCHEDULE**'s are performed.

Select a scan mode of ON, 1-2, 1-3, 1-4 or 1-5 for setting each scan mode when the transformer selector **MA-650A** is connected.

Concerning the timing chart by settings, refer to **9.(8) Behavior in TRANS SCAN MODE**.

**(b) COMM CONTROL**

Selects a communication function.

**OFF:** No communication
**DATA OUTPUT:** One-way communication
**BI-DIRECTION:** Both-way communication

**(c) COMM MODE**

Selects a communication mode.

**RS-232C:** Communication by RS-232C
**RS-485:** Communication by RS-485

**(d) COMM UNIT#**

Input No. of an equipment (ID#).
The range is 00 to 31.

**(e) COMM SPEED**

Selects a communication speed.

**9600:** Communication at 9600 bps
**19200:** Communication at 19200 bps
**38400:** Communication at 38400 bps

**(f) NO CURR MONITOR START**

Set the starting time (Period for Neglect) of no-current supplying monitor. No-current supply is not detected during the Period for Neglect from the start of current supply.

**(g) PW MONITOR START**

Set the starting time (Neglect) of pulse width monitor.
No pulse width monitor is performed during the Neglect period from the start of current supply.

**(h) NG OUTPUT**

Set the mode of NG terminal.

**NORMALLY CLOSE:** Open at the occurrence of NG.
**NORMALLY OPEN:** Closed at the occurrence of NG.

**(i) READY OUTPUT**

Select the mode of READY terminal.

**WELD ON:** Ready at Weld On
**POWER ON:** Ready at Power On

**(j) ERROR**

Displays ③ **ERROR SETTING Screen**.

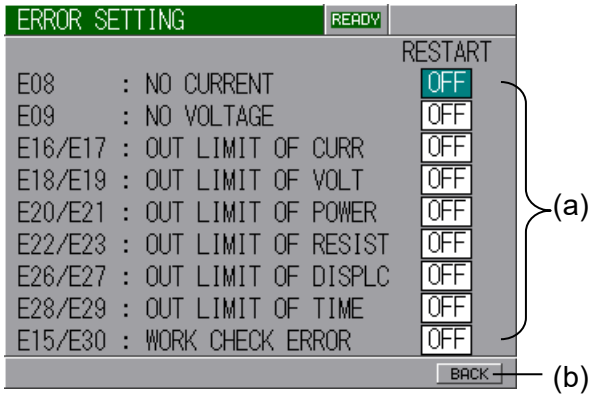
**(k) MISC**

Displays ④ **MISC Screen**.

**(l) PREV**

Displays ① **STATUS (1/2) Screen**.

### ③ ERROR SETTING Screen




The signals output at the occurrence of an error (NG Signal/Caution Signal) can be set item by item.

**(a) OFF/ON**

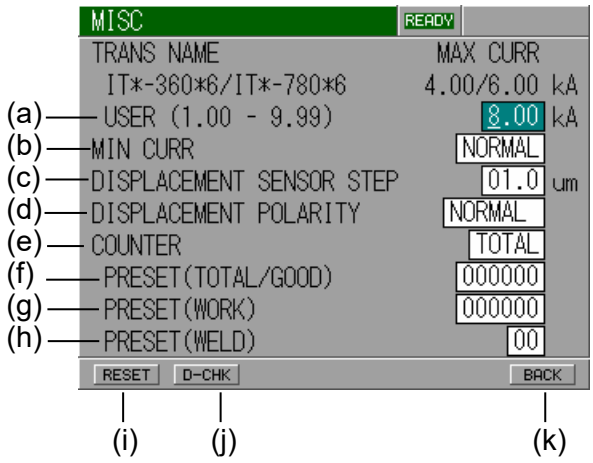
**OFF:** NG Signal is output.
The input of Start Signal is not accepted at the occurrence of NG.

**ON:** Caution Signal is output.
The input of Start Signal is accepted even at the occurrence of Caution.

**(b) BACK**

Displays ② **STATUS (2/2)** Screen of the previous page.

### ④ MISC Screen




**(a) USER (1.00 – 9.99)**

It is for testing. It cannot be used.

**(b) MIN CURR**

Set the minimum current.

**NORMAL:** Settable from 10% of full scale.
**LOW:** Settable from 2.5% of full scale.

Note: You can set lower current in LOW mode, but note that it may exceed the range of the setting accuracy when the setting is 10% of full scale or less.

**(c) DISPLACEMENT SENSOR STEP**

Input the resolution of Displacement Sensor.
Ex.)
**GS-1830A**, **GS-1813A**, **LGK-110**, **LG200-110**: 1.0 μm
**ST1278**: 0.5 μm

**(d) DISPLACEMENT POLARITY**

Set the polarity of displacement.

**NORMAL:** Set the force-applying direction as plus.
**REVERSE:** Set the force-applying direction as minus.

**(e) COUNTER**

Set the mode of Counter.

**TOTAL:** Count-up (increment of +1) is done despite the result of the judgment in monitoring when the current is supplied.

| Judgment in Monitor | Counting Manner |
|---|---|
| **GOOD** | Count-up |
| **CAUTION** | Count-up |
| **NG** | Count-up |

**GOOD:** Count-up is done if the judgment is **GOOD** in current-supplied monitoring.

| Judgment in Monitor | Counting Manner |
|---|---|
| **GOOD** | Count-up |
| **CAUTION** | No Count-up |
| **NG** | No Count-up |

**WORK:** Count-up is not done if the judgment is **NG** in current-supplied monitoring.

| Judgment in Monitor | Counting Manner |
|---|---|
| **GOOD** | **WELD** Counter counts-up.<br>**WORK** Counter counts-up (increment of +1) when **WELD** Counter reached the set value. |
| **CAUTION** | **WELD** Counter counts-up.<br>**WORK** Counter counts-up (increment of +1) when **WELD** Counter reached the set value. |
| **NG** | **WELD** Counter does not count-up.<br>**WELD** Counter is reset to 0 (zero) when NG is reset.<br>**WORK** Counter does not count-up. |

Note: The period for retaining the memory of counted numbers is approximately 10 days since the day when a power supply is turned off at latest.

**(f) PRESET (TOTAL/GOOD)**

Input the preset value of **TOTAL/GOOD** Counter.

**(g) PRESET (WORK)**

Input the preset value of **WORK** Counter.

**(h) PRESET (WELD)**

Input the preset value of **WELD** Counter.

**(i) RESET**

Resets the count.

**(j) D-CHK**

Checks the operation of Displacement Sensor. The amount of displacement is shown on the right side of this button.

**(k) BACK**

Displays ② **STATUS (2/2)** Screen of the previous page.

# 7. Basic Operation

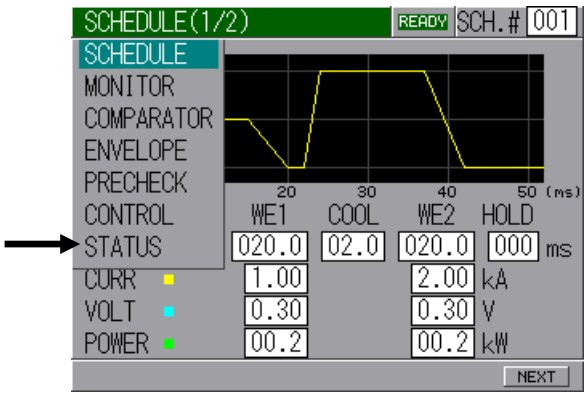
The example of a basic operation is described, using a transformer **IT*-780*6** and a control method of **Constant Current Control**.

(1) Connect correctly Welding Transformer **IT*-780*6** and peripheral equipments to **IPB-5000B**, referring to the connection way (**5. Installation and Connection**).

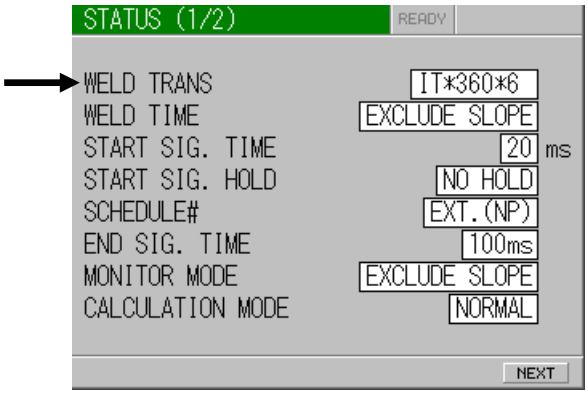
(2) Turn on the Breaker.

| CAUTION |
| --- |
| Check that the display screen and lamps are turned on normally. |

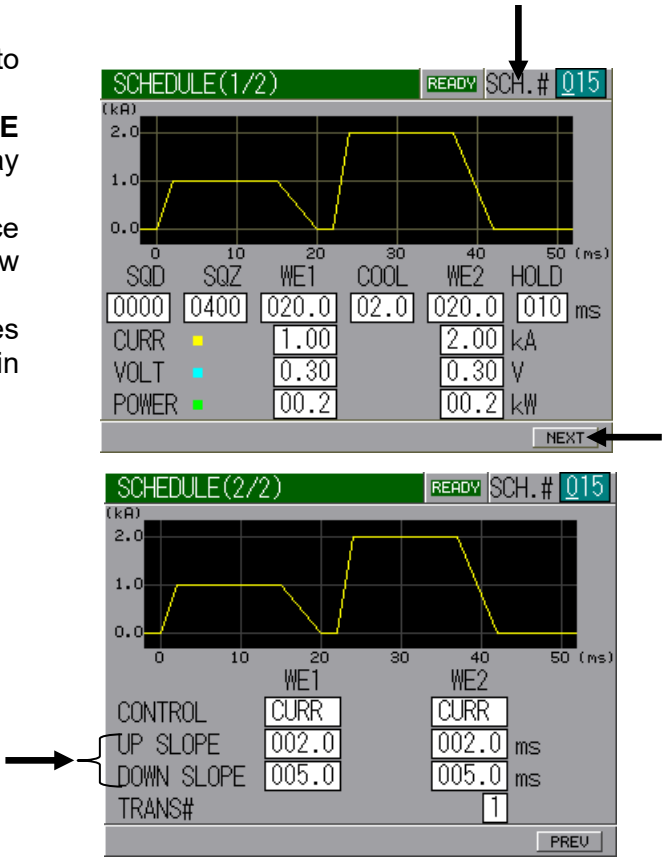
(3) Press **MENU key** on Front Panel to display **MENU Screen**.
Move the cursor ( ) to **STATUS** and press **ENTER Key**.




(4) **STATUS Screen** is displayed.
Set the function. Move the cursor ( ) to the desired item and press **+/- key** to select the function.
Set **IT*-780*6** to **WELD TRANS**.

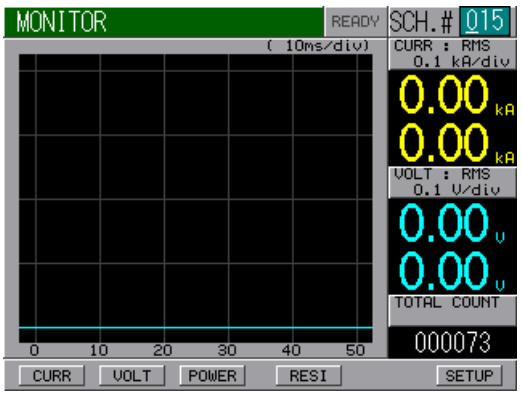


(5) Press **MENU Key** on Front Panel to display **MENU Screen**.
Move the cursor ( ) to **SCHEDULE** and press **ENTER Key** to display **SCHEDULE Screen**.
Move the cursor ( ) to each place and set the values of the table below to each place by **+/- Key**.
Press NEXT Button to set the values of UP SLOPE and DOWN SLOPE in the following screen.

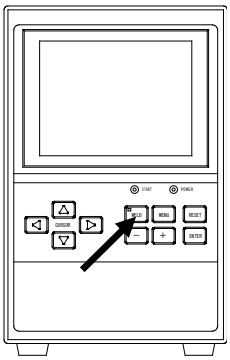



| Item | Value | Item | Value |
|---|---|---|---|
| **SCH. #** | 15 | **UP SLOPE** at **WE1** | 2 ms |
| **SQD** | 0 ms | **UP SLOPE** at **WE2** | 2 ms |
| **SQZ** | 400 ms | **DOWN SLOPE** at **WE1** | 5 ms |
| **WE1** | 20 ms | **DOWN SLOPE** at **WE2** | 5 ms |
| **COOL** | 2 ms | **CURR** at **WE1** | 1 kA |
| **WE2** | 20 ms | **CURR** at **WE2** | 2 kA |
| **HOLD** | 10 ms | | |

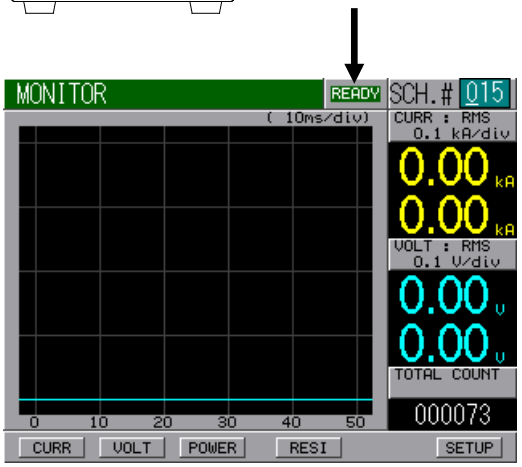
(6) For the test of welding, press **MENU Key** on Front Panel, select **MONITOR** and press **ENTER Key**. **MONITOR Screen** is displayed.



(7) Press **WELD Key** on Front Panel to light up **WELD Lamp** (LED).



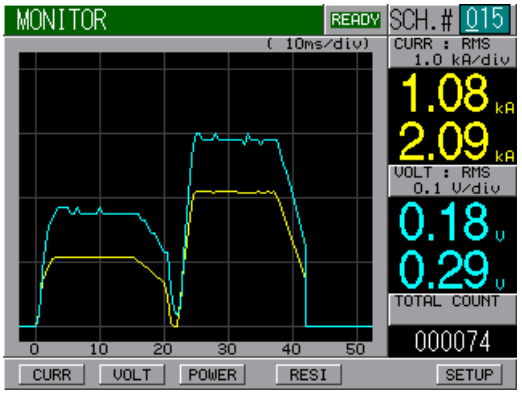
(8) Set ON (Closed circuit) to **WELD ON/OFF** on **Connecting Terminal Strip for External Input/Output Signal** at Rear Panel.
Make sure that the letter of **READY** on the upper right of Screen is green-lighted.




(9) Set ON (Closed circuit) to **SCH1**, **SCH2**, **SCH4** and **SCH8** on **Connecting Terminal Strip for External Input/Output Signal** at Rear Panel for setting **SCH. #015**.

(10) Set ON (Closed circuit) to 2ND STAGE Start Input to begin testing the weld.
The squeeze signal is output, and then the weld head begins to squeeze for the weld.

As the figure on the right is displayed, check that the weld schedule is correctly set.




## ⚠ WARNING

When confirming the operation, check that **SQZ Time** (Squeeze Time) is sufficient.

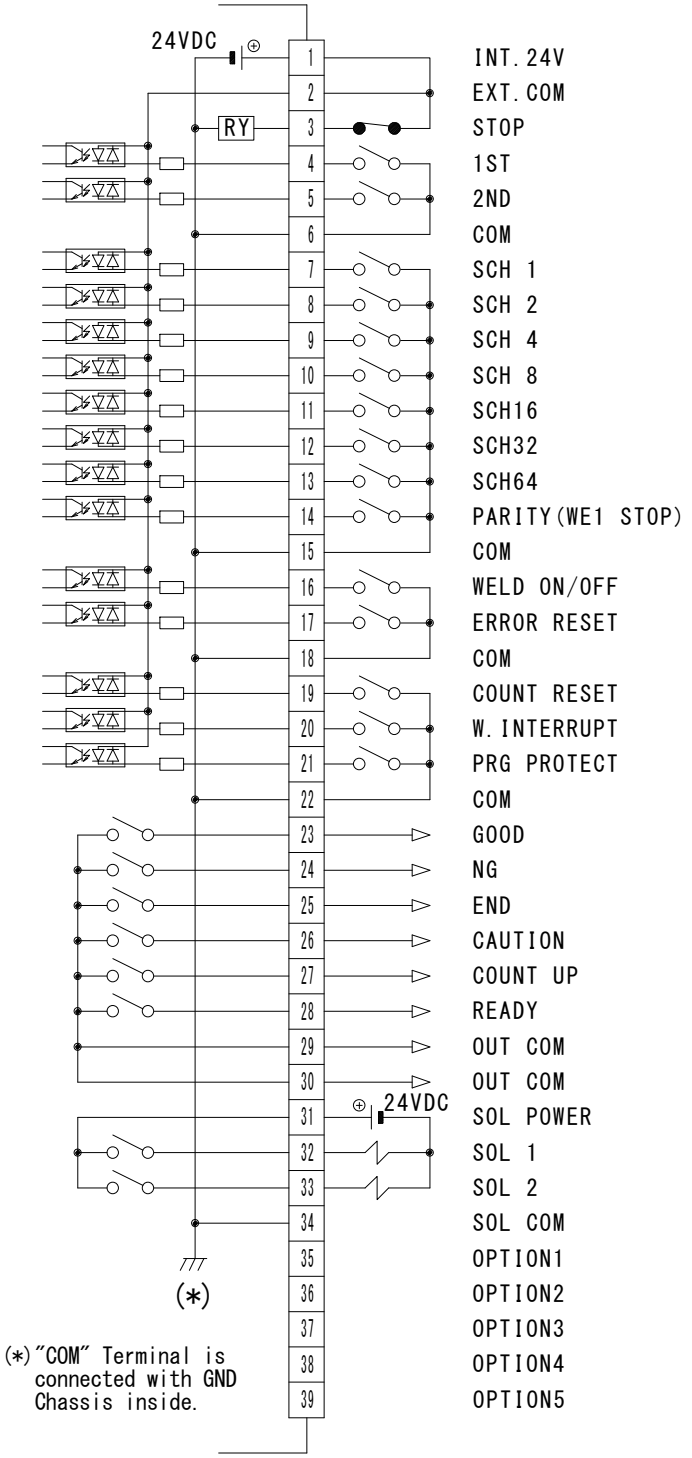
If weld current flows before the welding electrode force becomes sufficient, spatters are produced.

# 8. External Interface

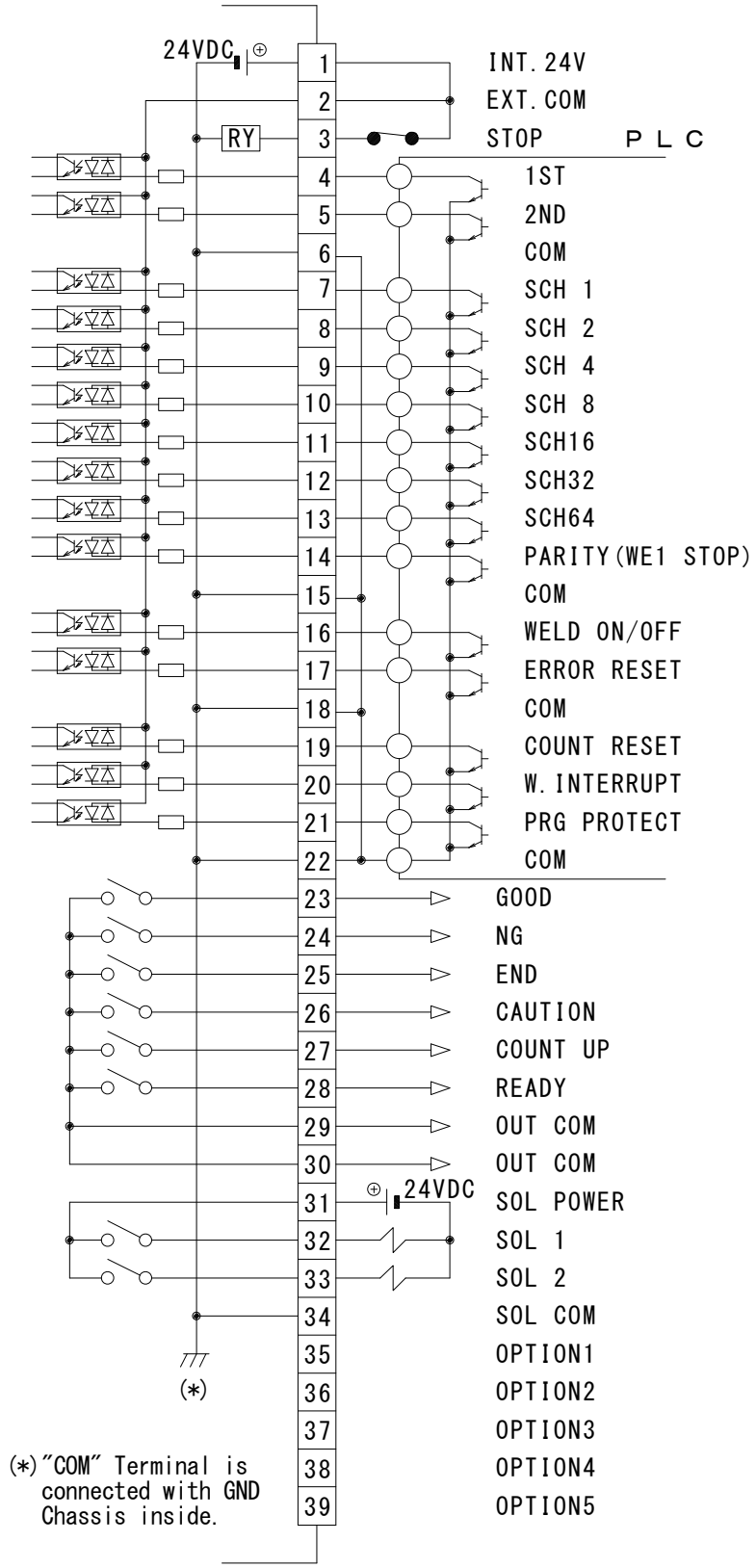
## (1) Connection Diagram for External Input/Output Signals

| CAUTION |
| --- |
| Use the shielded for the external input/output signals and connect the shielded line to the COM terminal (6, 15, 18, 22, or 34). |

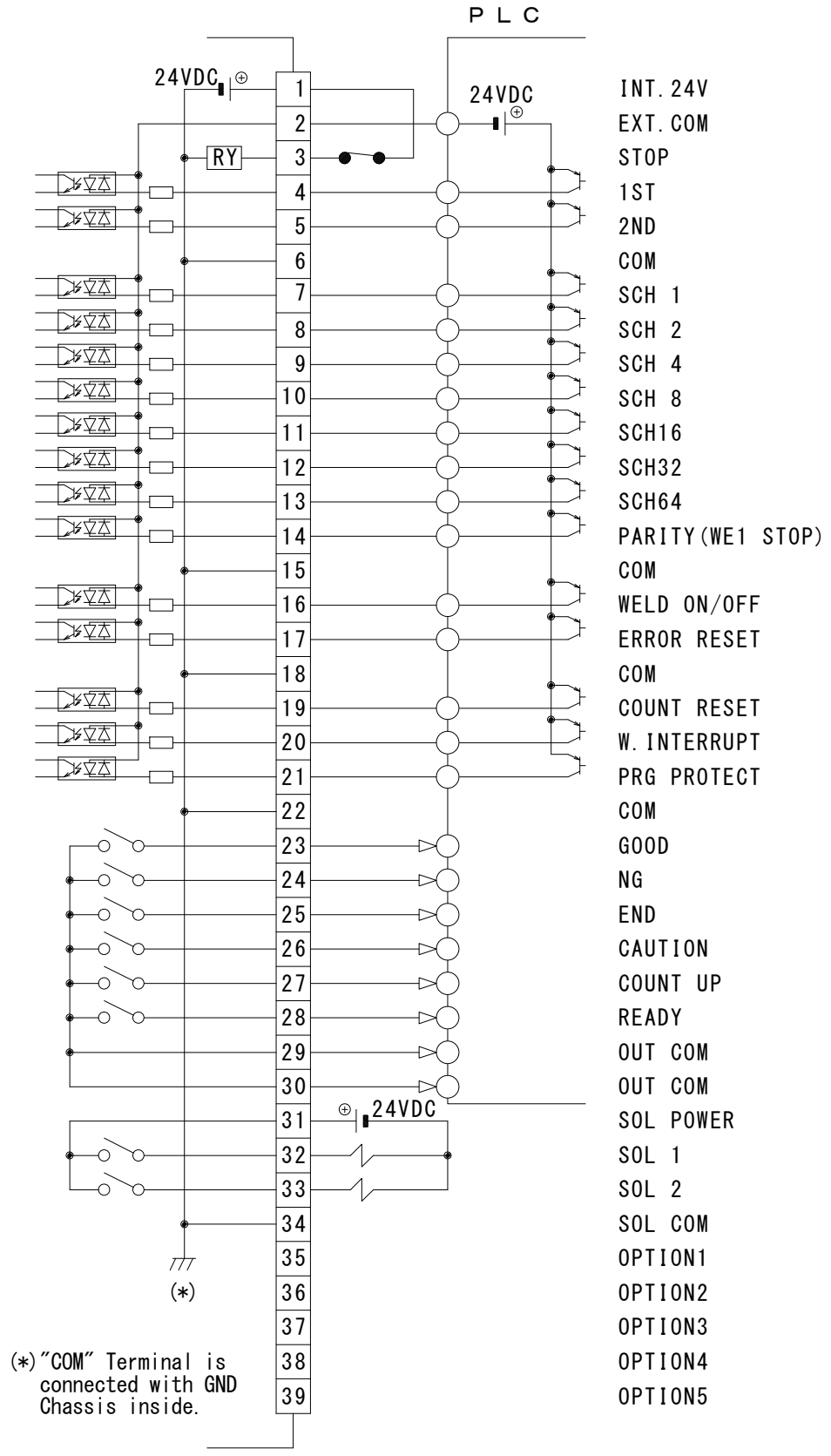
① When contacts on PLC are used as input signal



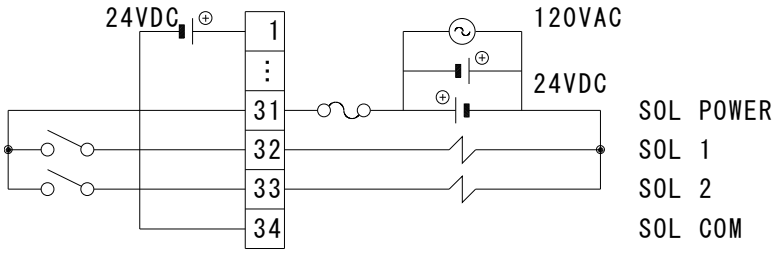
② When NPN transistor (sink type) on PLC is used as input signal



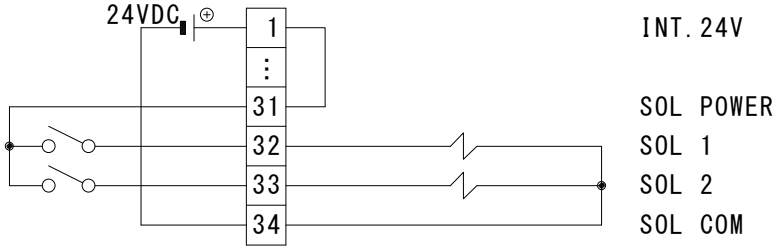
③ When PNP transistor (source type) on PLC is used as input signal



④ When solenoid valves are activated by the use of an external power supply




⑤ When solenoid valves are activated by the use of an internal power supply




## (2) External Input/Output Signals

The contact input method is described as follows:

| Pin No. | Description |
|---|---|
| **1** | 24V DC Output Terminal.<br>When contacts or NPN transistor (sink type) on PLC is used as an input signal (for start or selecting Schedule, etc.), connect Pin 1 to Pin 2.<br>Note: Do not use Pin 1 other than for connecting to Pin 2 and Pin 3 or connecting to Pin 31 to activate a solenoid valve. If so, it may result in a trouble. |
| **2** | When contacts or NPN transistor (sink type) on PLC is used as an input signal (for start or selecting Schedule, etc.), connect Pin 2 to Pin 1.<br>When PNP transistor (source type) on PLC is used as an input signal (for start or selecting Schedule, etc.), connect Pin 2 to COM Terminal on PLC. |
| **3** | Normally, connect Pin 3 to Pin 1.<br>When opening Pin 3, a trouble display “Operation Stop” comes out and the operation stops.<br>When the sequence is required to stop on the way while employing the start in a self-sustaining manner, open this Pin. |
| **4** | 1ST STAGE Input Terminal.<br>Closing of this Pin makes SOL1 Terminal of Pin 32 close.<br>As the current-supplying sequence does not start, the adjustment or check of a squeeze location can be done. When closing 2ND STAGE Terminal at this location, the weld at the optimum squeeze location can be obtained. |

| Pin No. | Description |
|---|---|
| **5** | 2ND STAGE Input Terminal.<br>Closing the Pin makes the sequence start.<br>When the sequence works, SOL2 Terminal on Pin 33 is closed. |
| **6** | COM Terminal. Internally connected to GND Chassis. |
| **7** to **13** | Schedule Input Terminal.<br>**7** = Schedule 1, **8** = Schedule 2, **9** = Schedule 4, **10** = Schedule 8,<br>**11** = Schedule 16, **12** = Schedule 32, **13** = Schedule 64,<br>When the select method of Schedule is External Schedule Select Method, they work.<br>The sum of Schedule No. of closed Pins is corresponding to the selected Schedule No. (Refer to **(3) Schedule No. and Schedule Select Terminal**.) |
| **14** | Parity Input or WE1 STOP Input Terminal.<br>The setting of **SCHEDULE#** in **6.(9)①STATUS (1/2) Screen** allows the function to be switched.<br>When **EXT. (P)** is selected in **SCHEDULE#**,<br>Parity Input Terminal.<br>This Pin makes it possible to detect a trouble caused by the breaking of a Schedule Select Signal wire. Select Pins so that the sum of the numbers of closed Schedule Select Signal wires and a Parity Signal wire may always be odd. (Refer to **(3) Schedule No. and Schedule Select Terminal**.)<br>When **EXT. (NP)** or **PANEL** is selected in **SCHEDULE#**,<br>The function is changed in dependence on the selection of **WELD STOP (INPUT)** at **6.(8) CONTROL Screen**.<br>* In the case of **OFF** selected at **INPUT**,<br>It is WE1 Stop Input Terminal.<br>When this Pin is closed while the sequence works at WE1 (**W1**), the sequence skips to COOL (**CO**).<br>* In the case of **DISPLC****, **CURR** and **VOLT** selected at **INPUT**,<br>This terminal does not work.<br>** (only for Displacement Sensor equipped) |
| **15** | COM Terminal. Internally connected to GND Chassis. |
| **16** | Weld ON/OFF Input Terminal.<br>Closed circuit is for Weld ON and Open circuit for Weld OFF.<br>As weld current does not flow even in the activated sequence if the Pin is open, it can be used at starting for trial.<br>Note: When the Pin is open in the process of sequence (including the End signal and the screen display time), the monitor value is not displayed. Except in an emergency, open the Pin after the End signal and the screen display time are complete (see **9.(1) Fundamental Sequence**). |
| **17** | Error and Caution Reset Input Terminal.<br>When the Pin is closed after eliminating a cause of NG or Caution, a display of NG or Caution is reset. |
| **18** | COM Terminal. Internally connected to GND Chassis. |
| **19** | Count Reset Input Terminal. Close the Pin when resetting a counter. |

| Pin No. | Description |
|---|---|
| **20** | Interrupt Input Terminal.<br>The function is changed in dependence on the selection of **WELD STOP (INPUT)** at **6.(8)CONTROL Screen**.<br>* In the case of **OFF** selected at **INPUT**,<br>When this Pin is closed while the sequence works at WE1 (**W1**), COOL (**CO**) and WE2 (**W2**), the sequence skips to HOLD.<br>* In the case of **DISPLC****, **CURR** and **VOLT** selected at **INPUT**,<br>This terminal does not work.<br>** (Only for Displacement Sensor equipped) |
| **21** | Program Protection Input Terminal.<br>If the Pin is closed, the condition of settings cannot be changed.<br>In order to make the settings effect, once turn off the power supply. |
| **22** | COM Terminal. Internally connected to GND Chassis. |
| **23** | GOOD Signal Output Terminal.<br>If it is determined that the measured value is inside the range set in MONITOR Screen after a weld sequence has ended, the Pin keeps closed for the certain period. The period of closing can be selected among **HOLD**, 10 ms and 100 ms. The rated capacity of a contact is 24V DC 20 mA (Semi-conductor switch used). |
| **24** | NG Signal Output Terminal.<br>The signal is output when the measured value goes out of the range set in COMPARATOR, PRECHECK and ENVELOPE Screen after a weld sequence has ended or when a trouble occurs in an operation.<br>(An error output signal, NG or Caution can be switched at the setting in **6.(9)③ERROR SETTING** Screen.)<br>The operation stays stopped at the occurrence of an error until the reset signal is input.<br>The output manner can be selected at the setting of **NG OUTPUT** in **6.(9)②STATUS (2/2)** Screen.<br>**NORMALLY CLOSE**<br>The Pin is closed with the power turned on, but becomes open with an error occurring.<br>**NORMALLY OPEN**<br>The Pin is closed with an error occurring.<br>The rated capacity of a contact is 24V DC 20 mA (Semi-conductor switch used). |
| **25** | END Signal Output Terminal.<br>After the sequence has ended, the Pin is closed for the certain period. The period of closing can be set to **HOLD**, 10 ms or 100 ms.<br>The signal also is output when the sequence is made operate in the condition of WELD OFF. The rated capacity of a contact is 24V DC 20 mA (Semi-conductor switch used). |
| **26** | CAUTION Signal Output Terminal.<br>When ON is set at **ERROR SETTING** Screen, NG Signal can be switched to Caution Signal. The Pin is closed after the weld sequence has ended. Even if Caution Signal is generated, the welding operation can be continued.<br>Input a reset signal or start signal for releasing Caution Signal.<br>The rated capacity of a contact is 24V DC 20 mA (Semi-conductor switch used). |

| Pin No. | Description |
|---|---|
| **27** | COUNT-UP Output Terminal.<br>The Pin is closed when COUNT-UP reaches the set pre-set count value. Input Count Reset Signal for releasing the output of COUNT-UP.<br>The rated capacity of a contact is 24V DC 20 mA (Semi-conductor switch used). |
| **28** | READY Output Terminal.<br>The output manner can be selected at the setting of **READY OUTPUT** in **6.(9)②STATUS (2/2)** Screen.<br>**WELD ON**<br>Closed at the time when weld current is ready for being supplied. Open at WELD OFF or in the occurrence of NG.<br>**POWER ON**<br>Closed in the occasion when the power supply of **IPB-5000B** is turned on.<br>The rated capacity of a contact is 24V DC 20 mA (Semi-conductor switch used). |
| **29** | COMMON Terminal for Output.<br>Shared commonly for GOOD, NG, END, CAUTION, COUNT UP and READY. |
| **30** | COMMON Terminal for Output.<br>Shared commonly for GOOD, NG, END, CAUTION, COUNT UP and READY. |
| **31** | POWER Input Terminal for activating a solenoid valve.<br>Input the power of 120V AC, 24V AC/DC.<br>Note: When an external power supply is used, prepare the power supply protected by a fuse. |
| **32** | Solenoid Valve 1 Output Terminal.<br>Closed at inputting of 1ST STAGE. The rated capacity of a contact is 120V AC, 24V AC/DC 0.5 A (Semi-conductor switch used). Prepare a solenoid valve with the current capacity of 0.5 A or less. |
| **33** | Solenoid Valve 2 Output Terminal.<br>Closed when the sequence works. The rated capacity of a contact is 120V AC, 24V AC/DC 0.5 A (Semi-conductor switch used). Prepare a solenoid valve with the current capacity of 0.5 A or less. |
| **34** | COM Terminal for Solenoid Valve.<br>Used for activating a solenoid valve by the use of an internal power supply.<br>Internally connected to GND Chassis. |
| **35** | Preparatory Input Terminal. (Do not connect here. If it is connected without instruction, it may be damaged.) |
| **36** | Preparatory Input Terminal. (Do not connect here. If it is connected without instruction, it may be damaged.) |
| **37** | Preparatory Output Terminal. (Do not connect here. If it is connected without instruction, it may be damaged.) |
| **38** | Preparatory Output Terminal. (Do not connect here. If it is connected without instruction, it may be damaged.) |
| **39** | Preparatory Output Terminal. (Do not connect here. If it is connected without instruction, it may be damaged.) |

## (3) Schedule No. and Schedule Select Terminals

**Schedule No.: SCHEDULE#** **●: Closed** **Blank: Open**

| SCHEDULE# | SCH 1 | SCH 2 | SCH 4 | SCH 8 | SCH16 | SCH32 | SCH64 | PARITY |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | ● |
| 1 | ● | | | | | | | |
| 2 | | ● | | | | | | |
| 3 | ● | ● | | | | | | ● |
| 4 | | | ● | | | | | |
| 5 | ● | | ● | | | | | ● |
| 6 | | ● | ● | | | | | ● |
| 7 | ● | ● | ● | | | | | |
| 8 | | | | ● | | | | |
| 9 | ● | | | ● | | | | ● |
| 10 | | ● | | ● | | | | ● |
| 11 | ● | ● | | ● | | | | |
| 12 | | | ● | ● | | | | ● |
| 13 | ● | | ● | ● | | | | |
| 14 | | ● | ● | ● | | | | |
| 15 | ● | ● | ● | ● | | | | ● |
| 16 | | | | | ● | | | |
| 17 | ● | | | | ● | | | ● |
| 18 | | ● | | | ● | | | ● |
| 19 | ● | ● | | | ● | | | |
| 20 | | | ● | | ● | | | ● |
| 21 | ● | | ● | | ● | | | |
| 22 | | ● | ● | | ● | | | |
| 23 | ● | ● | ● | | ● | | | ● |
| 24 | | | | ● | ● | | | ● |
| 25 | ● | | | ● | ● | | | |
| 26 | | ● | | ● | ● | | | |
| 27 | ● | ● | | ● | ● | | | ● |
| 28 | | | ● | ● | ● | | | |
| 29 | ● | | ● | ● | ● | | | ● |
| 30 | | ● | ● | ● | ● | | | ● |
| 31 | ● | ● | ● | ● | ● | | | |
| 32 | | | | | | ● | | |
| 33 | ● | | | | | ● | | ● |
| 34 | | ● | | | | ● | | ● |
| 35 | ● | ● | | | | ● | | |
| 36 | | | ● | | | ● | | ● |
| 37 | ● | | ● | | | ● | | |
| 38 | | ● | ● | | | ● | | |
| 39 | ● | ● | ● | | | ● | | ● |
| 40 | | | | ● | | ● | | ● |
| 41 | ● | | | ● | | ● | | |
| 42 | | ● | | ● | | ● | | |
| 43 | ● | ● | | ● | | ● | | ● |

**Schedule No.: SCHEDULE#** **●: Closed** **Blank: Open**

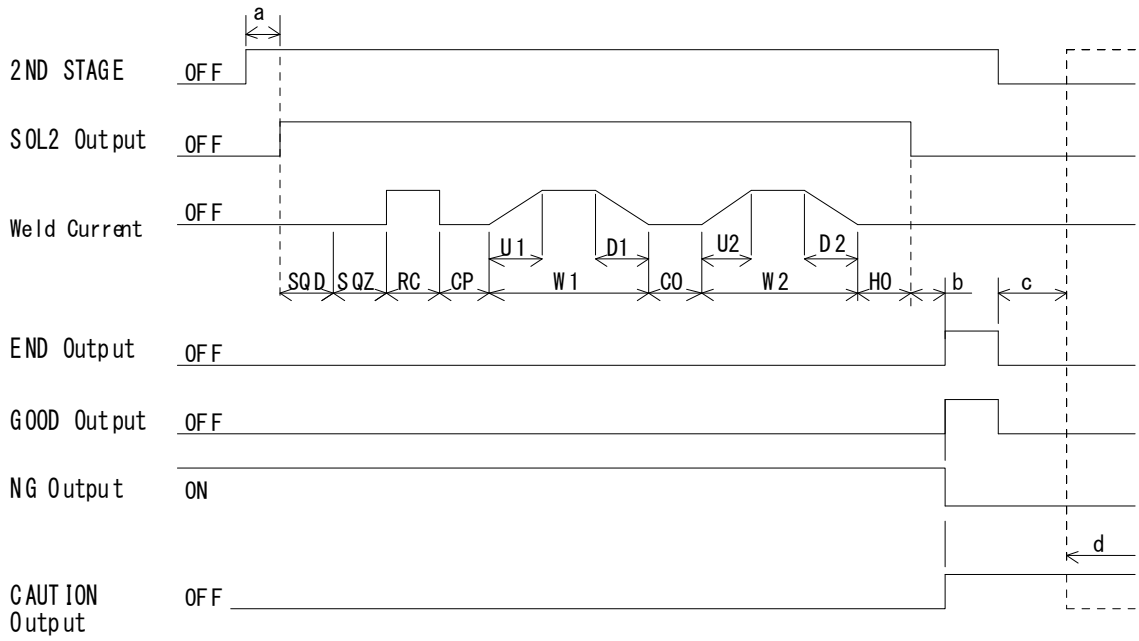
| SCHEDULE# | SCH 1 | SCH 2 | SCH 4 | SCH 8 | SCH16 | SCH32 | SCH64 | PARITY |
|---|---|---|---|---|---|---|---|---|
| 44 | | | ● | ● | | ● | | |
| 45 | ● | | ● | ● | | ● | | ● |
| 46 | | ● | ● | ● | | ● | | ● |
| 47 | ● | ● | ● | ● | | ● | | |
| 48 | | | | | ● | ● | | ● |
| 49 | ● | | | | ● | ● | | |
| 50 | | ● | | | ● | ● | | |
| 51 | ● | ● | | | ● | ● | | ● |
| 52 | | | ● | | ● | ● | | |
| 53 | ● | | ● | | ● | ● | | ● |
| 54 | | ● | ● | | ● | ● | | ● |
| 55 | ● | ● | ● | | ● | ● | | |
| 56 | | | | ● | ● | ● | | |
| 57 | ● | | | ● | ● | ● | | ● |
| 58 | | ● | | ● | ● | ● | | ● |
| 59 | ● | ● | | ● | ● | ● | | |
| 60 | | | ● | ● | ● | ● | | ● |
| 61 | ● | | ● | ● | ● | ● | | |
| 62 | | ● | ● | ● | ● | ● | | |
| 63 | ● | ● | ● | ● | ● | ● | | ● |
| 64 | | | | | | | ● | |
| 65 | ● | | | | | | ● | ● |
| 66 | | ● | | | | | ● | ● |
| 67 | ● | ● | | | | | ● | |
| 68 | | | ● | | | | ● | ● |
| 69 | ● | | ● | | | | ● | |
| 70 | | ● | ● | | | | ● | |
| 71 | ● | ● | ● | | | | ● | ● |
| 72 | | | | ● | | | ● | ● |
| 73 | ● | | | ● | | | ● | |
| 74 | | ● | | ● | | | ● | |
| 75 | ● | ● | | ● | | | ● | ● |
| 76 | | | ● | ● | | | ● | |
| 77 | ● | | ● | ● | | | ● | ● |
| 78 | | ● | ● | ● | | | ● | ● |
| 79 | ● | ● | ● | ● | | | ● | |
| 80 | | | | | ● | | ● | ● |
| 81 | ● | | | | ● | | ● | |
| 82 | | ● | | | ● | | ● | |
| 83 | ● | ● | | | ● | | ● | ● |
| 84 | | | ● | | ● | | ● | |
| 85 | ● | | ● | | ● | | ● | ● |
| 86 | | ● | ● | | ● | | ● | ● |
| 87 | ● | ● | ● | | ● | | ● | |
| 88 | | | | ● | ● | | ● | |

**Schedule No.: SCHEDULE#** **●: Closed** **Blank: Open**

| SCHEDULE# | SCH 1 | SCH 2 | SCH 4 | SCH 8 | SCH16 | SCH32 | SCH64 | PARITY |
|---|---|---|---|---|---|---|---|---|
| 89 | ● | | | ● | ● | | ● | ● |
| 90 | | ● | | ● | ● | | ● | ● |
| 91 | ● | ● | | ● | ● | | ● | |
| 92 | | | ● | ● | ● | | ● | ● |
| 93 | ● | | ● | ● | ● | | ● | |
| 94 | | ● | ● | ● | ● | | ● | |
| 95 | ● | ● | ● | ● | ● | | ● | ● |
| 96 | | | | | | ● | ● | ● |
| 97 | ● | | | | | ● | ● | |
| 98 | | ● | | | | ● | ● | |
| 99 | ● | ● | | | | ● | ● | ● |
| 100 | | | ● | | | ● | ● | |
| 101 | ● | | ● | | | ● | ● | ● |
| 102 | | ● | ● | | | ● | ● | ● |
| 103 | ● | ● | ● | | | ● | ● | |
| 104 | | | | ● | | ● | ● | |
| 105 | ● | | | ● | | ● | ● | ● |
| 106 | | ● | | ● | | ● | ● | ● |
| 107 | ● | ● | | ● | | ● | ● | |
| 108 | | | ● | ● | | ● | ● | ● |
| 109 | ● | | ● | ● | | ● | ● | |
| 110 | | ● | ● | ● | | ● | ● | |
| 111 | ● | ● | ● | ● | | ● | ● | ● |
| 112 | | | | | ● | ● | ● | |
| 113 | ● | | | | ● | ● | ● | ● |
| 114 | | ● | | | ● | ● | ● | ● |
| 115 | ● | ● | | | ● | ● | ● | |
| 116 | | | ● | | ● | ● | ● | ● |
| 117 | ● | | ● | | ● | ● | ● | |
| 118 | | ● | ● | | ● | ● | ● | |
| 119 | ● | ● | ● | | ● | ● | ● | ● |
| 120 | | | | ● | ● | ● | ● | ● |
| 121 | ● | | | ● | ● | ● | ● | |
| 122 | | ● | | ● | ● | ● | ● | |
| 123 | ● | ● | | ● | ● | ● | ● | ● |
| 124 | | | ● | ● | ● | ● | ● | |
| 125 | ● | | ● | ● | ● | ● | ● | ● |
| 126 | | ● | ● | ● | ● | ● | ● | ● |
| 127 | ● | ● | ● | ● | ● | ● | ● | |

# 9. Timing Chart

## (1) Fundamental Sequence




Symbol:

| | |
|---|---|
| SQD: Squeeze Delay Time | SQZ: Squeeze Time |
| RC: Resistance Pre-check Time | CP: Resistance Judgment Time (1ms) |
| U1: Upslope 1 Time | W1: 1st Weld Time |
| D1: Downslope 1 Time | CO: Cool Time |
| U2: Upslope 2 Time | W2: 2nd Weld Time |
| D2: Downslope 2 Time | HO: Hold Time |

**a**: Sum of the period set at **START SIG. TIME** and the period for preparing the supply of weld current (0.4 ms max.)

**b**: Monitored Value Computing Time
Changes in dependence on Monitor Value Calculation Mode (**CALCULATION MODE** at **6.(9)①STATUS(1/2)Screen**) and Communication Setting (**COMM CONTROL** and **COMM SPEED** at **6.(9)②STATUS(2/2)Screen**).

① In the case of **OFF** or **BI-DIRECTION** at **COMM CONTROL**,

| Calculation Mode Setting (**CALCULATION MODE**) | |
|---|---|
| **NORMAL** | **FAST** |
| 205 ms Max. | 155 ms Max. |

② In the case of **DATA OUTPUT** at **COMM CONTROL**,
Communication data output time is included.

| Communication Speed Setting (**COMM SPEED**) | Calculation Mode Setting (**CALCULATION MODE**) | |
|---|---|---|
| | **NORMAL** | **FAST** |
| **9600bps** | 330 ms Max. | 280 ms Max. |
| **19200bps** | 275 ms Max. | 225 ms Max. |
| **38400bps** | 245 ms Max. | 195 ms Max. |

**c**: Screen Display Time and Start Signal Standby Time

① **Screen Display Time**

Screen Display Time is the period required from the end of END Signal Output for screen displaying.
It is 355 ms Max. However, it changes in accordance with the type of screens as follows.

| Display Screen | Period |
|---|---|
| SCHEDULE | 205 ms Max. |
| MONITOR (The next coming signal makes the screen display cancelled in MONITOR Screen.) | 0 ms |
| COMPARATOR | 220 ms Max. |
| ENVELOPE | 355 ms Max. |
| PRECHECK | 60 ms Max. |
| CONTROL | 55 ms Max. |
| STATUS | 0 ms |

Note) If the takt time is needed to shorten, display the MONITOR or STATUS screen.

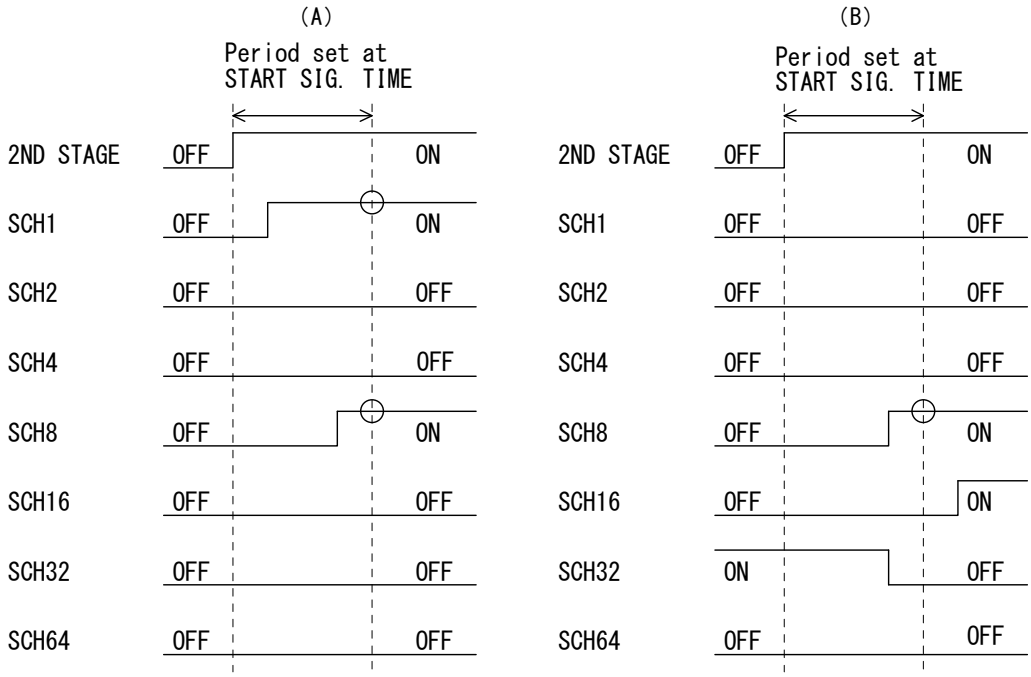
② **Start Signal Standby Time**

It is the period necessary for opening Start Input Signal.
After Screen Display Time elapsed, it is required to open Start Input for 10ms or more.

**d**: **CAUTION Output** is switched to OFF at the coming input of Start Signal.

## (2) Determination of Weld Schedule

Weld Schedule is determined after Chattering Prevention Time, "**START SIG. TIME**" elapses from the input of Start Signal.

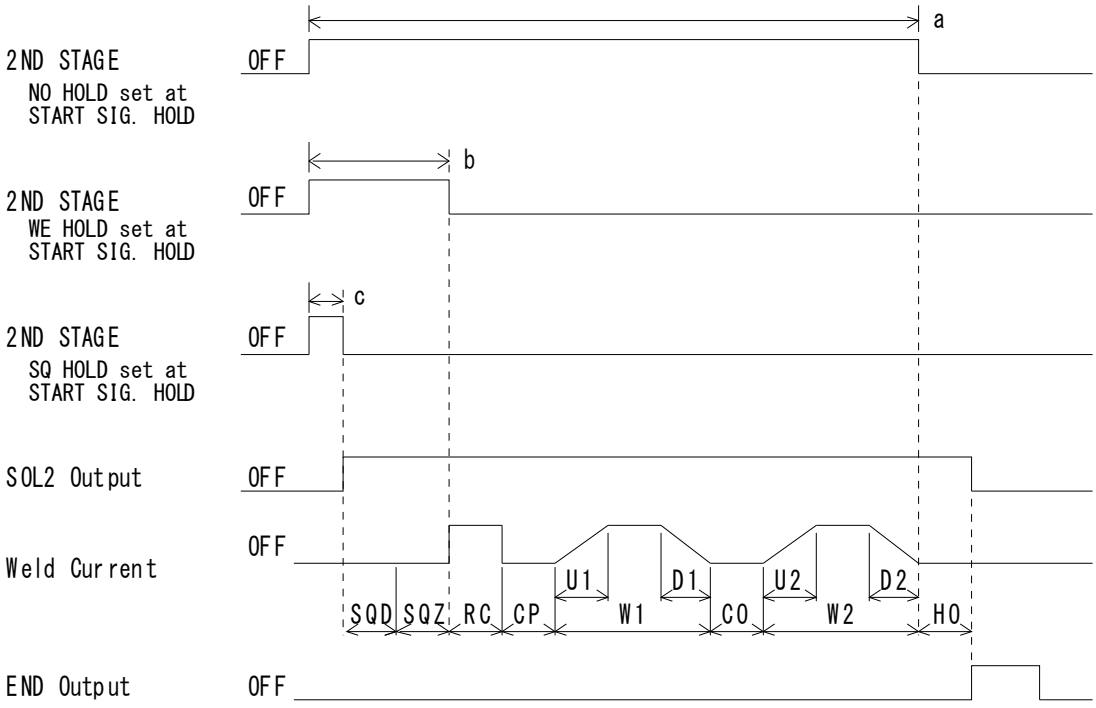



In the above figure (A), as SCH 1 and SCH 8 are set to ON, weld is performed at Schedule #9.

In (B), as only SCH 8 is set to ON, weld is at Schedule #8. As SCH 16 and 32 are set to OFF at the timing of determining Schedule, they are invalid.

## (3) Behavior of START SIG. HOLD

* **NO HOLD** Setting: If Start Signal is made open during the period from SQD to W2, a weld sequence is broken off on the way and results in **E13: CYCLE ERROR**.
  Even if Start Signal is made open during HO, the weld sequence goes to an end.
* **WE HOLD** Setting: After a beginning of W1, a weld sequence goes to an end even if Start Signal is made open.
* **SQ HOLD** Setting: After Start Signal is accepted, a weld sequence goes to an end even if Start Signal is made open.




Symbol:

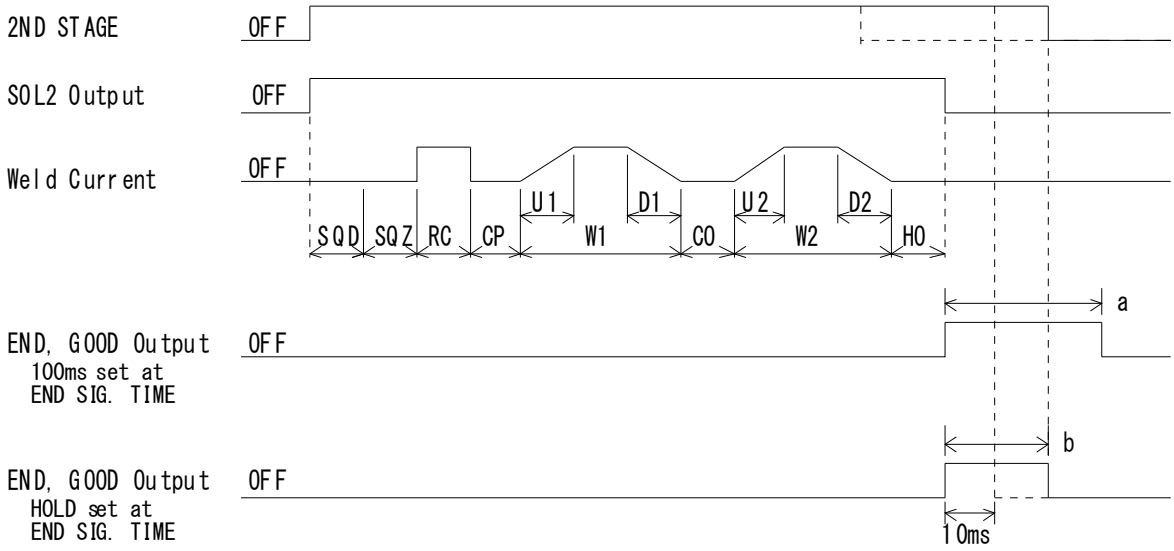
| | |
|---|---|
| SQD: Squeeze Delay Time | SQZ: Squeeze Time |
| RC: Resistance Pre-check Time | CP: Resistance Judgment Time (1 ms) |
| U1: Upslope 1 Time | W1: 1st Weld Time |
| D1: Downslope 1 Time | CO: Cool Time |
| U2: Upslope 2 Time | W2: 2nd Weld Time |
| D2: Downslope 2 Time | HO: Hold Time |

**a**: Closed circuit is required until the termination of W2.
**b**: Closed circuit is required until the termination of SQZ.
**c**: Closed circuit is required until the beginning of SQZ.

## (4) Behavior of END SIG. TIME

* **HOLD**: When **2ND STAGE** Signal is closed for 10ms or less, **END** or **GOOD** Signal is output for 10ms.
When **2ND STAGE** Signal is closed for the longer period than 10ms, **END** or **GOOD** Signal is output for the closed period.

* **10ms**, **100ms**: **END** or **GOOD** Signal is output for the set period regardless of the condition of **2ND STAGE** Signal.




Symbol:

| | |
|---|---|
| SQD: Squeeze Delay Time | SQZ: Squeeze Time |
| RC: Resistance Pre-check Time | CP: Resistance Judgment Time (1 ms) |
| U1: Upslope 1 Time | W1: 1st Weld Time |
| D1: Downslope 1 Time | CO: Cool Time |
| U2: Upslope 2 Time | W2: 2nd Weld Time |
| D2: Downslope 2 Time | HO: Hold Time |

**a**: During the set period (100 ms), **END** or **GOOD** Signal is output regardless of the condition of **2ND STAGE** Input.

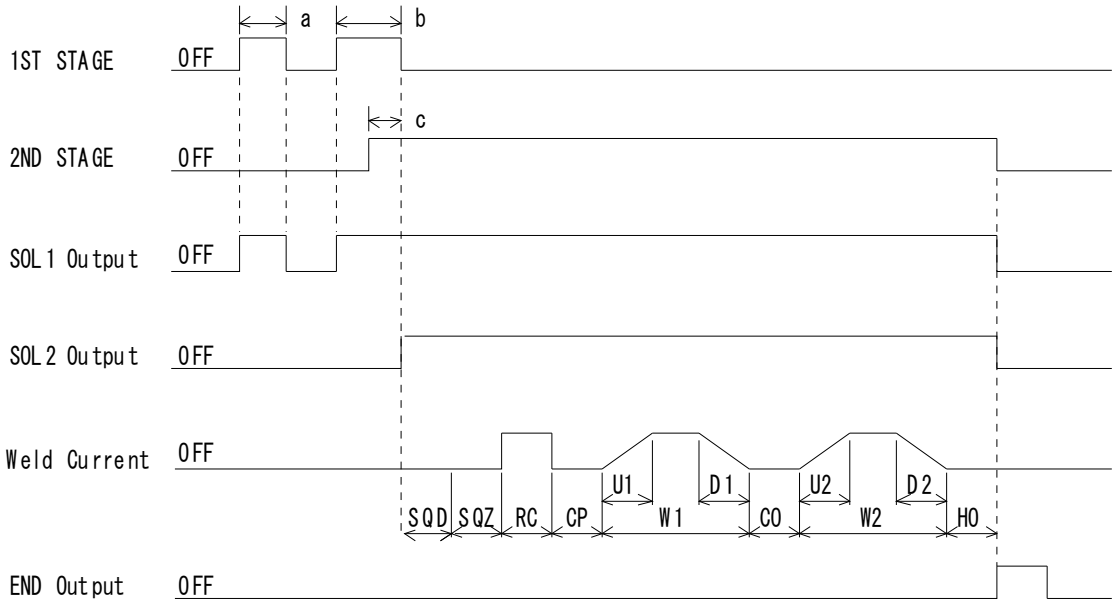
**b**: When the period of **2ND STAGE** Input is 10 ms or less, **END** or **GOOD** Signal is output for 10 ms.
When the period of **2ND STAGE** Input is longer than 10 ms. **END** or **GOOD** Signal is output until **2ND STAGE** Input is open.

## (5) Behavior of SOL1 and SOL2

**SOL1** Output works by the Input of **1ST STAGE**. When **1ST STAGE** Input is open, **SOL1** Output also becomes open if it is before the start of a weld sequence. After the start of a sequence, even if **1ST STAGE** Input is open, **SOL1** Output keeps closed until the sequence comes to an end.

When using **SOL1**, **1ST STAGE** Input allows **SOL1** to adjust a squeeze location. After inputting **1ST STAGE**, weld current can be supplied by **2ND STAGE** Input. **SOL1** becomes opened with **SOL2** output after the end of HO in spite of the input condition of **1ST STAGE**.

**SOL2** output works by the Input of **2ND STAGE** and is closed from SQD to HO.



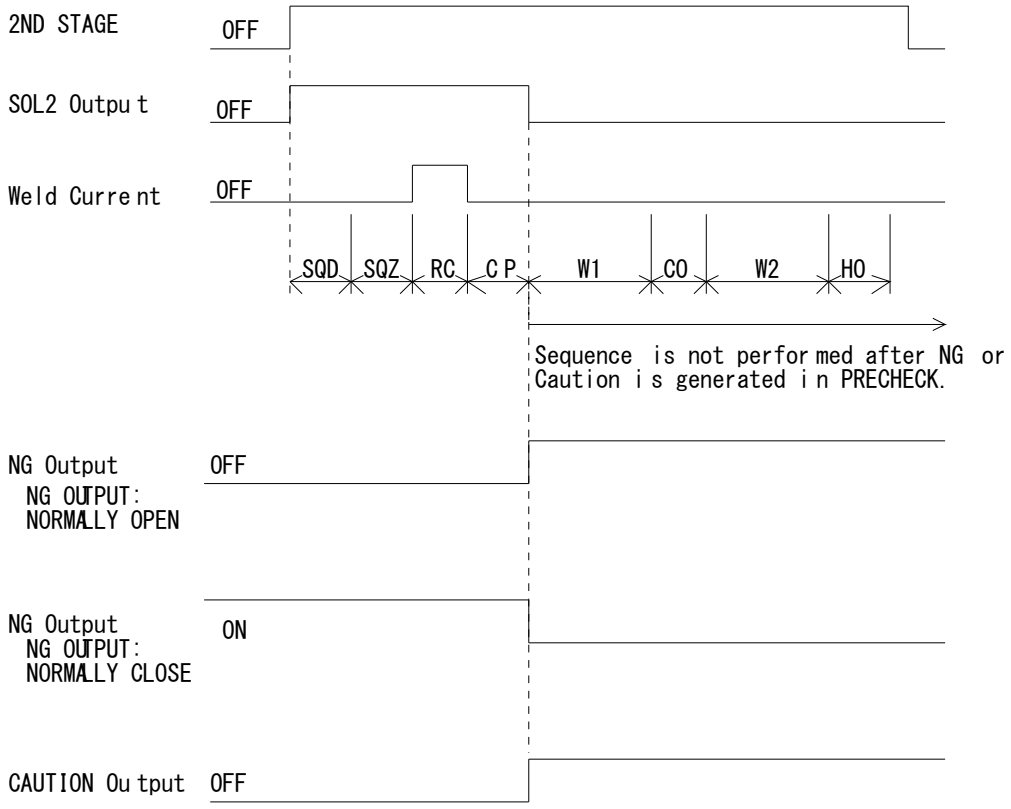

Symbol:

| | |
|---|---|
| SQD: Squeeze Delay Time | SQZ: Squeeze Time |
| RC: Resistance Pre-check Time | CP: Resistance Judgment Time (1 ms) |
| U1: Upslope 1 Time | W1: 1st Weld Time |
| D1: Downslope 1 Time | CO: Cool Time |
| U2: Upslope 2 Time | W2: 2nd Weld Time |
| D2: Downslope 2 Time | HO: Hold Time |

**a**: When **1ST STAGE** Input is open before the start of a weld sequence, **SOL1** Output also becomes open.
**b**: Once the sequence is started, **SOL1** Output keeps closed until HO is completed even if **1ST STAGE** Input is made open.
**c**: **START SIG. TIME**, the period set for prevention of chattering.

## (6) “Error” or “Caution” in PRECHECK

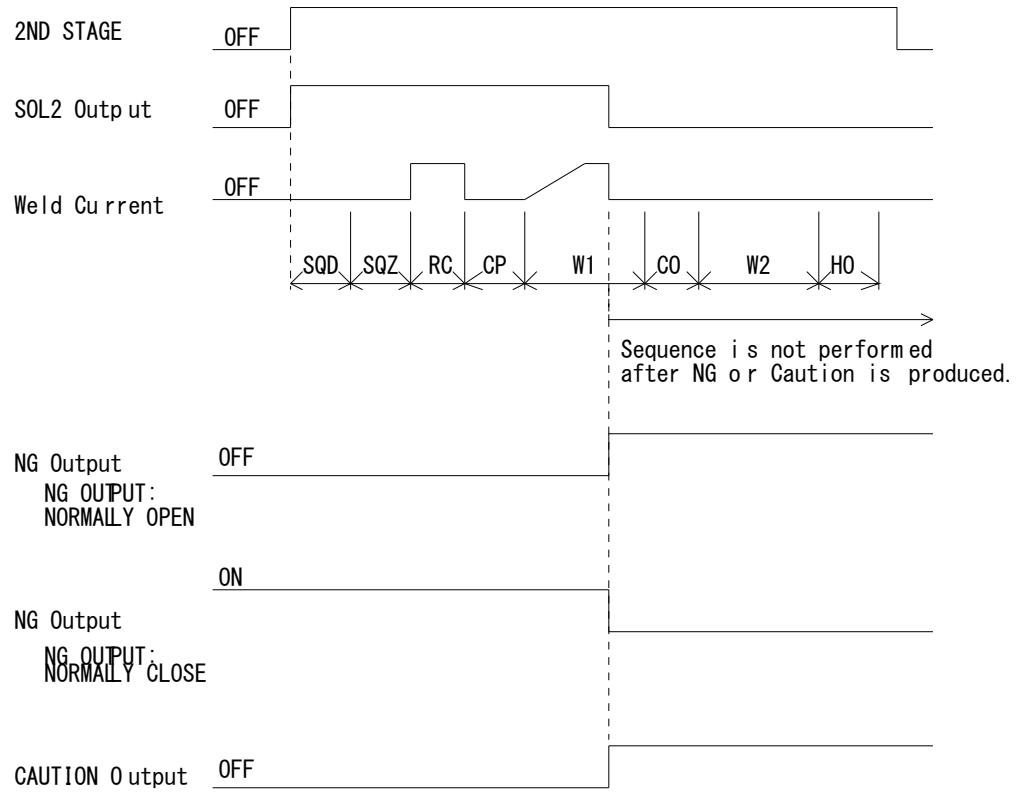
An example of weld sequence is shown, representing that a current goes out of the range between the upper and lower limit set in **PRECHECK Screen** with an error signal, “**NG**” or “**Caution**” generated in the use of PRECHECK Current Supply function.




(END Output is not produced.)

## (7) At Occurrence of “Error” or “Caution”

A sample weld sequence is shown, which represents the occasion where **NG** or **CAUTION** is produced while current is supplied.




(END Output is not produced.)

Note) Reset an error at least a second after an error is displayed.
If an error is reset immediately, the display may not disappear.

## (8) Behavior in TRANS SCAN MODE

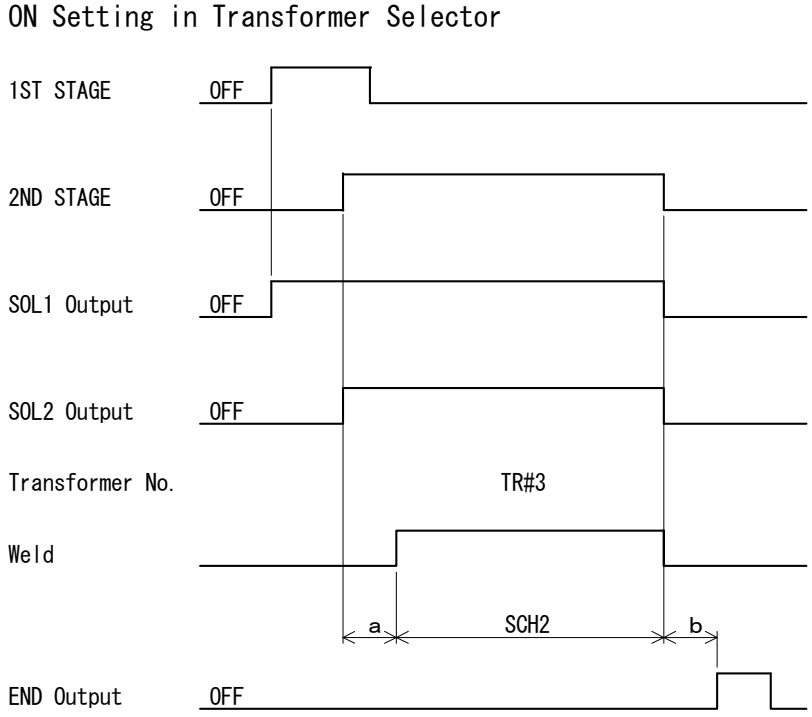
**① OFF Setting**

It is a setting of the case where Transformer Selector **MA-650A** is not used.
The behavior is the same as the one in **(1) Fundamental Sequence**.

Those settings mentioned below in ② through ⑥ are the ones of the case where Transformer Selector **MA-650A** is used.

**② ON Setting**

The weld current is supplied through the transformer set at the item of Transformer No. (**TR#**) in **SCHEDULE Screen**.
Supposing that **SCHEDULE No.** is 2 (**SCH2**) and Transformer No. is 3 (**TR#3**), the timing chart where the supply of weld current is started is shown as follows.




a: Transformer Changeover Time (10 ms)

b: Time period for computing a monitored value
See **b: Time period for computing a monitored value** at **9.(1) Fundamental Sequence**.

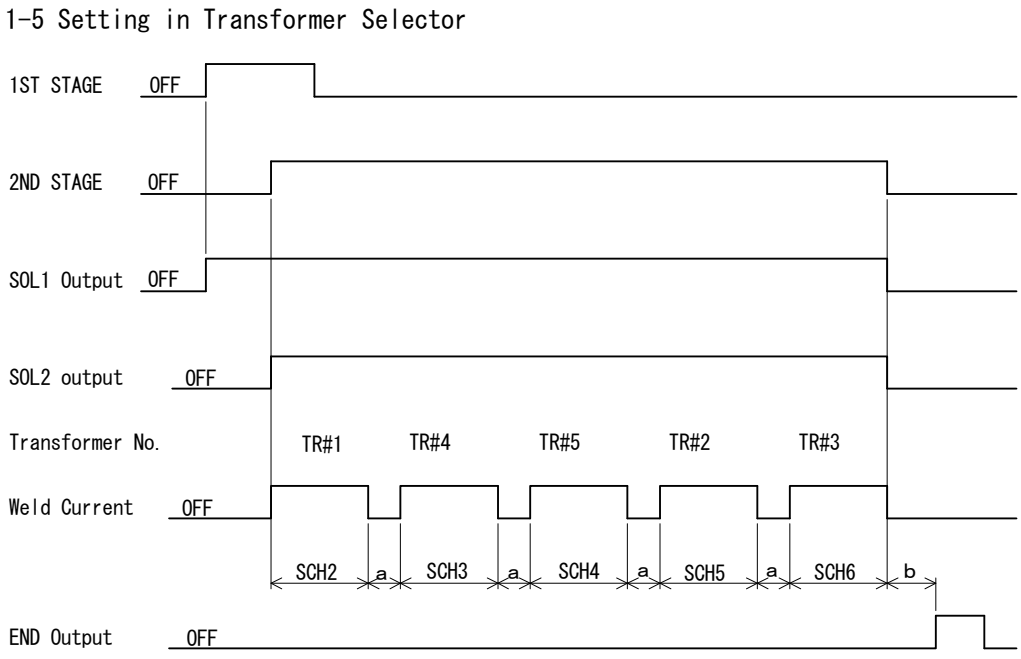
Because Transformer 3 (**TR#3**) is set for **SCHEDULE #2** (**SCH2**), weld current is supplied through the Transformer connected to Transformer 3 in Transformer Selector **MA-650A**.

### ③ 1-5 Setting

Firstly, weld current is supplied on the first selected **SCHEDULE No.** (N), then on the next **SCHEDULE No.** (N+1), and then on the consecutive **SCHEDULE Nos.** N+2, N+3, N+4 in turn.
In this occasion, weld current is supplied through the transformer selected at Transformer No. (**TR#**) in each **SCHEDULE Screen**.

That is to say, in the case that the supply of weld current is started in the condition of SCHEDULE No.2 selected, firstly weld current is supplied on SCHEDULE No.2, then SCHEDULE No.3, SCHEDULE No.4, SCHEDULE No.5, lastly on SCHEDULE No.6.

For example, Supposing that **SCHEDULE No.** is 2 (**SCH2**) and Transformer No. is 1 (**TR#1**), similarly **SCH3**-**TR#4**, **SCH4**-**TR#5**, **SCH5**-**TR#2**, **SCH6**-**TR#3**, the timing chart where the supply of weld current is started is shown as follows.




As Transformer 1 (**TR#1**) is set for the first SCHEDULE No.2 (**SCH2**), weld current is firstly supplied through the transformer connected to Transformer 1 of Transformer Selector **MA-650A**, and then through Transformer 4, Transformer 5, Transformer 2 and Transformer 3 in turn. The Squeeze Delay Time (**SQD**) is added in the first weld current only. In the example above, it is added in **SCH2** only.

**a**: Monitored Value Computing Time and Transformer Changeover Time

It is the sum of **b**: Monitored Value Computing Time plus Transformer Changeover Time, 10 ms.

**b**: Monitored Value Computing Time

Changes in dependence on Monitor Value Calculation Mode (**CALCULATION MODE** at **6.(9)①STATUS (1/2) Screen**), Communication Setting (**COMM CONTROL** and **COMM SPEED** at **6.(9)②STATUS (2/2) Screen**) and the type of screens as the following page.

1) In the case of **OFF** or **BI-DIRECTION** at **COMM CONTROL**,

| Display Screen | CALCULATION MODE | |
|---|---|---|
| | NORMAL | FAST |
| SCHEDULE | 360 ms | 310 ms |
| MONITOR | 205 ms | 155 ms |
| COMPARATOR | 380 ms | 330 ms |
| ENVELOPE | 515 ms | 465 ms |
| PRECHECK | 220 ms | 170 ms |
| CONTROL | 215 ms | 165 ms |
| STATUS | 205 ms | 155 ms |

Note)
The values at the tables show maximum ones.

2) In the case of **DATA OUTPUT** at **COMM CONTROL**,

| COMM SPEED | Display Screen | CALCULATION MODE | |
|---|---|---|---|
| | | NORMAL | FAST |
| **9600bps** | SCHEDULE | 485 ms | 435 ms |
| | MONITOR | 330 ms | 280 ms |
| | COMPARATOR | 505 ms | 455 ms |
| | ENVELOPE | 640 ms | 590 ms |
| | PRECHECK | 345 ms | 295 ms |
| | CONTROL | 340 ms | 290 ms |
| | STATUS | 330 ms | 280 ms |
| **19200bps** | SCHEDULE | 430 ms | 380 ms |
| | MONITOR | 275 ms | 225 ms |
| | COMPARATOR | 450 ms | 400 ms |
| | ENVELOPE | 585 ms | 535 ms |
| | PRECHECK | 290 ms | 240 ms |
| | CONTROL | 285 ms | 235 ms |
| | STATUS | 275 ms | 225 ms |
| **38400bps** | SCHEDULE | 400 ms | 350 ms |
| | MONITOR | 245 ms | 195 ms |
| | COMPARATOR | 420 ms | 370 ms |
| | ENVELOPE | 555 ms | 505 ms |
| | PRECHECK | 260 ms | 210 ms |
| | CONTROL | 255 ms | 205 ms |
| | STATUS | 245 ms | 195 ms |

Note)
The values at the tables show maximum ones.

**④ 1-2 Setting**

As same as in ③ **1-5 Setting**, weld current is supplied on the consecutive 2 **SCHEDULE No.'s** in turn.

Weld current is supplied through the transformer selected at Transformer No. (**TR#**) in each **SCHEDULE Screen**.

**⑤ 1-3 Setting**

Similarly in the following part, weld current is supplied on the consecutive 3 **SCHEDULE No.'s**.
Weld current is supplied through the transformer selected at Transformer No. (**TR#**) in each **SCHEDULE Screen**.
The Squeeze Delay Time (**SQD**) is added in the first weld current only.

**⑥ 1-4 Setting**

Weld current is supplied on the consecutive 4 **SCHEDULE No.'s**.
Weld current is supplied through the transformer selected at Transformer No. (**TR#**) in each **SCHEDULE Screen**.
The Squeeze Delay Time (**SQD**) is added in the first weld current only.

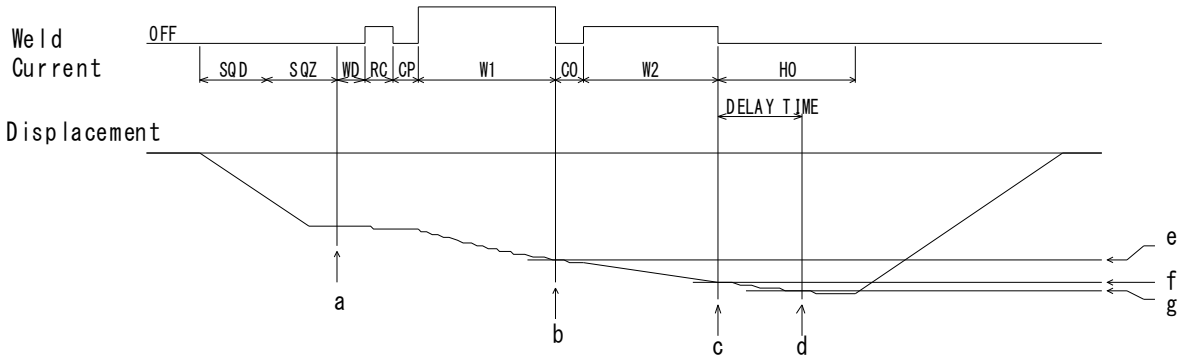
**NG/CAUTION during Weld Current Supplied**

When the errors of Upper Limit (**H**) and Lower Limit (**L**) of the weld current, voltage, power and resistance are set as the setting of NG, the equipment stops by the NG Signal at the occurrence of the errors. When the errors of them are set as the setting of CAUTION, the CAUTION Signal is generated after completing all the supply of weld current.
Concerning the errors of CAUTION when the count-up of a counter has reached the preset counter value, the CAUTION Signal is generated after completing all the supply of weld current.

Concerning NG/CAUTION in other judgment, the equipment stops at the occurrence of NG/CAUTION.

Note) The monitor is not redisplayed when the weld current is not supplied in the schedule (the weld time is 0 ms).
Also, the next welding starts, redisplaying the monitor is interrupted.
Therefore, when the last schedule of transformer changeover is set not to supply the weld current, the previous monitor is remained displayed.

# (9) Movement of Displacement Sensor




Symbol:

SQD: Squeeze Delay Time
SQZ: Squeeze Time
WD: Work Detecting Time (0.4 ms Max.)
RC: Resistance Pre-check Time
CP : Resistance Judgment Time (1 ms)
W1: 1st Weld Time
CO : Cool Time
W2: 2nd Weld Time
HO: Hold Time

**a**: Work Detection
When the range of work detection is set to the work detection (**WORK DETECT** at **6.(8) CONTROL Screen**), the work detection is done after the end of SQZ. If the range of work detection is set to +/-00.00 mm, no work detection is done. Work detection Time is of 0.4 ms Max.

**b**: 1st Weld Stop (W1)
When the displacement weld stop (DISPLC) is set to 1st Weld Stop to set the displacement (**WE1 DINPUT** at **6.(8) CONTROL Screen**) and the displacement sensor arrives at the set displacement (**e** at the above figure), 1st Weld is stopped to make the sequence move to the next cool time (CO).

**c**: 2nd Weld Stop (W2)
When the displacement weld stop (DISPLC) is set to 2nd Weld Stop to set the displacement (**WE1 DINPUT** at **6.(8) CONTROL Screen**) and the displacement sensor arrives at the set displacement (**f** at the above figure), 2nd Weld is stopped to make the sequence move to the next hold time (HO).

**d**: Delay Time
When the value of Delay Time is set to DELAY TIME (**DELAY TIME** at **6.(8) CONTROL Screen**), the displacement (**g** at the above figure) after the delay time elapses is measured.

# 10. External Communication Function

## (1) Introduction

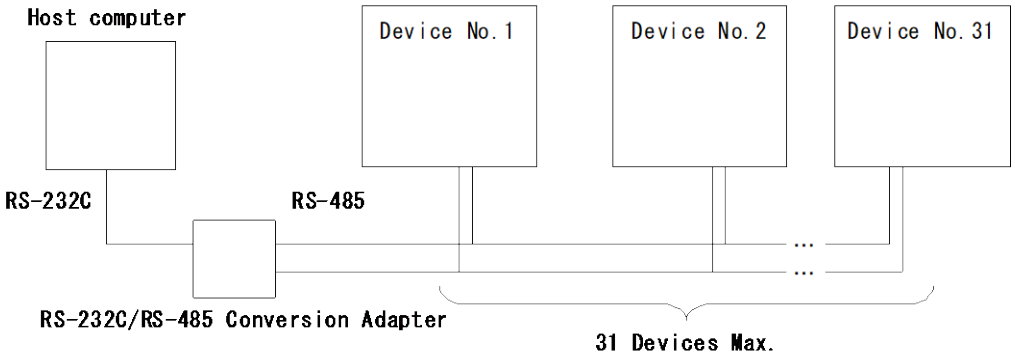
**IPB-5000B** can be used to set schedules from an externally-connected personal computer (abbreviated as PC) or to read monitored data and several kinds of status data.

## (2) Data Transmission

| Item | Content |
|---|---|
| Transmission Mode | Select either of the followings at **STATUS Screen**:<br>* RS-485, Asynchronous, Half-Duplex<br>* RS-232C |
| Transmission Rate | Select either of the followings at **STATUS Screen**:<br>9600, 19200, 38400 bps |
| Data Format | Start bit: 1, Data bit: 8, Stop bit: 1, Parity bit: Even |
| Character Code | Output in ASCII code<br>LF Code: [LF] 0AH, Space Code: [SP] 32H<br>CR Code: [CR] 0DH |
| Checksum Data | None |
| Connector | D-Sub 9 pins<br>Pin Position<br>In RS-485, 5: SG, 6: RS+, 9: RS-<br>In RS-232C, 2: RXD, 3: TXD, 5: SG |

## (3) Configuration

### ① RS-485

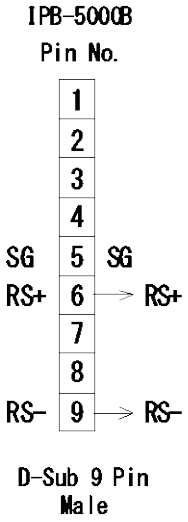


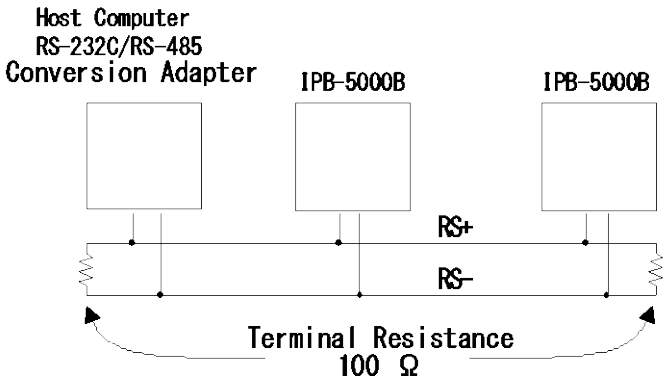

Note 1: When controlling two or more Lasers with one host computer, register the device No. (**COMM UNIT#**) for each device. Set the device No. at **STATUS Screen** (See **6.(9)②(d)**).

Note 2: Do not assign one number to more than one device. If one number is assigned to more than one device, data collision and inappropriate system operations may result.

Note 3: The RS-232C/RS-485 conversion adapter is not included in the accessories. It is required to prepare the adapter at customer's side.

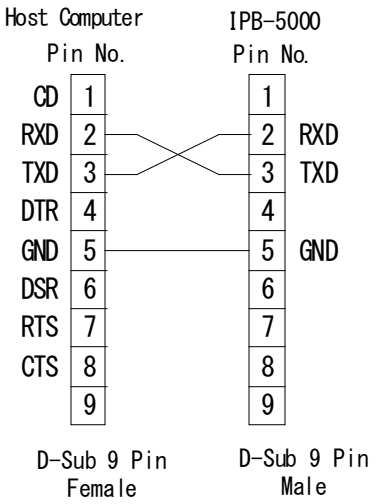
**Connection of RS-485**



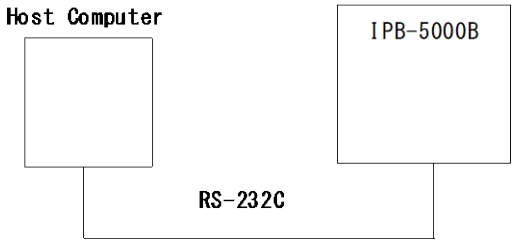




For pin numbers without instructions
Do not connect anything.

### ② RS-232C




For pin numbers without instructions
Do not connect anything.




Only a device can be connected.

## (4) Protocol

**① Single-directional Communication Mode**
(When **DATA OUTPUT** is selected at **COMM CONTROL** in **STATUS Screen**)

**1) Monitor Data**

Data strings: !01001:1.49,1.51,0.51,0.55, 0.7, 0.3,2.01,2.03,0.61,
A B C D E F G H I J K

0.55, 1.2, 0.3,+01.250,010.0,010.0,-00.300 [CR] [LF]
L M N O P Q R

| | | |
|---|---|---|
| A | Device No. | Fixed to 2 digits (00 to 31) |
| B | Schedule No. | Fixed to 3 digits (001 to 127) |
| C | Monitor Current of **WE1** (**RMS**) | Fixed to 4 digits (0.00 to 6.00) (kA) |
| D | Monitor Current of **WE1** (**PEAK**) | Fixed to 4 digits (0.00 to 6.00) (kA) |
| E | Monitor Voltage of **WE1** (**RMS**) | Fixed to 4 digits (0.00 to 9.99) (V) |
| F | Monitor Voltage of **WE1** (**PEAK**) | Fixed to 4 digits (0.00 to 9.99) (V) |
| G | Monitor Power of **WE1** | Fixed to 4 digits (0.0 to 20.0) (kW) (**CURR**, **VOLT**, **COMB**, **POWER-H** Control) (NB1) |
| | | Fixed to 4 digits (0.00 to9.99) (kW) (**POWER-L** Control) |
| H | Monitor Resistance of **WE1** | Fixed to 4 digits (0.0 to 99.9) (mΩ) (NB1) |
| I | Monitor Current of **WE2** (**RMS**) | Fixed to 4 digits (0.00 to 6.00) (kA) |
| J | Monitor Current of **WE2** (**PEAK**) | Fixed to 4 digits (0.00 to 6.00) (kA) |
| K | Monitor Voltage of **WE2** (**RMS**) | Fixed to 4 digits (0.00 to 9.99) (V) |
| L | Monitor Voltage of **WE2** (**PEAK**) | Fixed to 4 digits (0.00 to 9.99) (V) |
| M | Monitor Power of **WE2** | Fixed to 4 digits (0.0 to 20.0) (kW) (**CURR**, **VOLT**, **COMB**, **POWER-H** Control) (NB1) |
| | | Fixed to 4 digits (0.00 to9.99) (kW) (**POWER-L** Control) |
| N | Monitor Resistance of **WE2** | Fixed to 4 digits (0.0 to 99.9) (mΩ) (NB1) |
| O | Final Displacement | Fixed to 7 digits (-29.999 to +29.999) (mm) |
| P | Weld Time of **WE1** | Fixed to 5 digits (000.0 to 500.0) (ms) |
| Q | Weld Time of **WE2** | Fixed to 5 digits (000.0 to 500.0) (ms) |
| R | Displacement at detecting Workpiece | Fixed to 7 digits (-29.999 to +29.999) (mm) |

NB1: The range between 0.0 and 9.9 is output as [SP]0.0 and [SP]9.9.

**2) Error Data**

Data strings: !01001:E01,02,03,05,07[CR][LF]
A B C D E F G

| | | |
|---|---|---|
| A | Device No. | Fixed to 2 digits (00 to 31) |
| B | Schedule No. | Fixed to 3 digits (001 to 127) (NB1) |
| C | Error Code 1 | Fixed to 2 digits (01 to 31) |
| D | Error Code 2 | Fixed to 2 digits (01 to 31) |
| E | Error Code 3 | Fixed to 2 digits (01 to 31) |
| F | Error Code 4 | Fixed to 2 digits (01 to 31) |
| G | Error Code 5 | Fixed to 2 digits (01 to 31) |

The number of Error Codes is of five Max. In the case of only one error code, the error codes D to G are omitted.

NB1: When a setting for consecutive weldings is selected in TANS SCAN MODE, the schedule number of the last occurred error is sent.

**② Bi-directional Communication Mode**

(When **BI-DIRECTION** is selected at **COMM CONTROL** in **STATUS Screen**)

Description of Symbols

ID1, ID2: Shows Device No.
Fixed to 2 digits (ID1=Ten's place, ID2=One's place)

SH1, SH2, SH3: Shows Schedule No.
Fixed to 3 digits (SH1=Hundred's place, SH2=Ten's place, SH3=One's place)

CD1, CD2, CD3: Shows Specified Code.
CD1----------Alphabet Classified Symbol
CD2, CD3----Code Classified Number
(See **(5)③Specified Code** for details of codes.)

| No. | Description of Command | Code |
|---|---|---|
| 1 | Inquiry about Model and ROM Version | # Device No. I |
| | Example: Read model of Device No. 1 and ROM Version<br>From Host PC to **IPB-5000B**<br>**# ID1 ID2 I CR LF**<br>(# 0 1 I CR LF)<br>From **IPB-5000B** to Host PC<br>**! ID1 ID2 : IPB-5000B , ROM Version CR LF**<br>(! 0 1 : IPB-5000B , ROM Version CR LF)<br>Note) When "*" is set for both ID1 and ID2, all connected devices respond. In the case that all devices respond, the time-lag of response is 100 ms multiplied by ID No. (Device No.). | |

<table>
<tr><th>No.</th><th>Description of Command</th><th>Code</th></tr>
<tr><td rowspan="2">2</td><td>Reading of Schedule Data</td><td># Device No. R Schedule No. *</td></tr>
<tr><td colspan="2">Example: Read all data of Schedule No. 8 in Device No. 01.<br>From Host PC to IPB-5000B<br><u># ID1 ID2 R SH1 SH2 SH3 * CR LF</u><br>(# 0 1 R 0 0 8 * CR LF)<br>From IPB-5000B to Host PC<br><u>! ID1 ID2 SH1 SH2 SH3 : Data String CR LF</u><br>(! 0 1 0 0 8 : Data String CR LF)<br>Note) When Schedule No. (SH1, SH2, SH3) is “000”, the basic set conditions are read.<br>See (5)①Order Table of Schedule Data for the data order of a Schedule.</td></tr>
<tr><td rowspan="2">3</td><td>Setting of Schedule Data</td><td># Device No. W Schedule No. : Data</td></tr>
<tr><td colspan="2">Example: Set data on Schedule No. 8 in Device No. 01.<br>From Host PC to IPB-5000B<br><u># ID1 ID2 W SH1 SH2 SH3 : Data String CR LF</u><br>(# 0 1 W 0 0 8 : Data String CR LF)<br>From IPB-5000B to Host PC<br><u>! ID1 ID2 SH1 SH2 SH3 : Data String CR LF</u><br>(! 0 1 0 0 8 : Data String CR LF)<br>Note) * Regarding the number of digits and location of the decimal point in each data, each data is required to follow Data Code Table and be separated with “,”.<br>* See (5)①Order Table of Schedule Data for the data order of a Schedule.<br>* When Schedule No. is “000”, the basic set conditions are set.<br>* The set data is returned as confirmation from IPB-5000B. When data outside the range is set, the last data before setting is exactly returned.</td></tr>
<tr><td rowspan="2">4</td><td>Reading of Specified Item</td><td># Device No. R Schedule No. Specified Code</td></tr>
<tr><td colspan="2">Example: Read 2nd. Weld Time (23 ms) on Schedule No. 31 in Device No. 01.<br>From Host PC to IPB-5000B<br><u># ID1 ID2 R SH1 SH2 SH3 CD1 CD2 CD3 CR LF</u><br>(# 0 1 R 0 3 1 T 0 7 CR LF)<br>From IPB-5000B to Host PC<br><u>! ID1 ID2 SH1 SH2 SH3 : Data CR LF</u><br>(! 0 1 0 3 1 T 0 7 : 0 2 3 . 0 m s CR LF)<br>Note) See (5)③Specified Code for Specified Code and Data.</td></tr>
</table>

<table>
<tr><th>No.</th><th>Description of Command</th><th>Code</th></tr>
<tr><td rowspan="2">5</td><td>Setting of Specified Data</td><td># Device No. W Schedule No. Specified Code : Data</td></tr>
<tr><td colspan="2">Example: Set the current of 1st. Weld Time on Schedule No. 31 in Device No. 01 to 3.2 kA.<br>From Host PC to IPB-5000B<br><u># ID1 ID2 W SH1 SH2 SH3 CD1 CD2 CD3 : Data CR LF</u><br>(# 0 1 W 0 3 1 H 0 1 : 3 . 2 0 k A CR LF)<br>From IPB-5000B to Host PC<br><u>! ID1 ID2 SH1 SH2 SH3 : Data CR LF</u><br>(! 0 1 0 3 1 H 0 1 : 3 . 2 0 k A CR LF)<br>Note) * See (5)③Specified Code for Specified Code and Data.<br>* Regarding the number of digits and location of the decimal point in each data, each data is required to follow Data Code Table.<br>* The set data is returned as confirmation from IPB-5000B. When data outside the range is set, the last data before setting is exactly returned.</td></tr>
<tr><td rowspan="2">6</td><td>Reading of Initial Setting</td><td># Device No. R Specified Code</td></tr>
<tr><td colspan="2">Example: Read model of Transformer IT*-360*6 (Data is 01) at Initial Setting (6.(9) STATUS Screen) in Device No. 01.<br>From Host PC to IPB-5000B<br><u># ID1 ID2 R CD1 CD2 CD3 CR LF</u><br>(# 0 1 R P 4 0 CR LF)<br>From IPB-5000B to Host PC<br><u>! ID1 ID2 CD1 CD2 CD3 : Data CR LF</u><br>(! 0 1 P 4 0 : 0 1 CR LF)<br>Note) See (5)③Specified Code for Specified Code and Data.</td></tr>
<tr><td rowspan="2">7</td><td>Setting of Initial Setting Condition</td><td># Device No. W Specified Code : Data</td></tr>
<tr><td colspan="2">Example: Set the time period during which Weld End Signal Time is output to 100 ms (Data is 01) at Initial Setting (6.(9) STATUS Screen) in Device No. 01.<br>From Host PC to IPB-5000B<br><u># ID1 ID2 W CD1 CD2 CD3 : Data CR LF</u><br>(# 0 1 W P 0 3 : 0 1 CR LF)<br>From IPB-5000B to Host PC<br><u>! ID1 ID2 CD1 CD2 CD3 : Data CR LF</u><br>(! 0 1 P 0 3 : 0 1 CR LF)<br>Note) * See (5)③Specified Code for Specified Code and Data.<br>* Regarding the number of digits and location of the decimal point in each data, each data is required to follow Data Code Table.<br>* The set data is returned as confirmation from IPB-5000B. When data outside the range is set, the last data before setting is exactly returned.</td></tr>
</table>

<table>
<tr><th>No.</th><th>Description of Command</th><th>Code</th></tr>
<tr><td rowspan="2">8</td><td>Reading of monitor data in specified range</td><td># Device No. ? Specifying of Range</td></tr>
<tr><td colspan="2">Example: Read monitor data from No. 0001 to 0017 in Device No. 01.<br>From Host PC to IPB-5000B<br><u># ID1 ID2 ? Start No. – End No. CR LF</u><br>(# 0 1 ? 0 0 0 1 - 0 0 1 7 CR LF)<br>From IPB-5000B to Host PC<br><u>! ID1 ID2 Start No. – End No., Data CR LF</u><br>(! 0 1 0 0 0 1 - 0 0 1 7 , Data String CR LF)<br>Note) See (5)②Order Table of Monitor Data for Start No. and End No.</td></tr>
<tr><td rowspan="2">9</td><td>Reading of Trouble</td><td># Device No. R E99</td></tr>
<tr><td colspan="2">Example: Read all troubled items (Error Codes, E02 E05) in Device No. 01.<br>From Host PC to IPB-5000B<br><u># ID1 ID2 R CD1 CD2 CD3 CR LF</u><br>(# 0 1 R E 9 9 CR LF)<br>From IPB-5000B to Host PC<br><u>! ID1 ID2 SH1 SH2 SH3 : Data CR LF</u><br>(! 0 1 E 9 9 : E 0 2 , E 0 5 CR LF)<br>Note) All error codes are read (Each error code is separated with “,”). In no trouble, data of “00” is returned.<br>(! 0 1 E 9 9 : 0 0 CR LF)</td></tr>
<tr><td rowspan="2">10</td><td>Error Reset</td><td># Device No. R E00</td></tr>
<tr><td colspan="2">Example: Release troubles in Device No. 01.<br>From Host PC to IPB-5000B<br><u># ID1 ID2 R E 0 0 CR LF</u><br>(# 0 1 R E 0 0 CR LF)<br>From IPB-5000B to Host PC<br><u>! ID1 ID2 E 0 0 : 0 0 CR LF</u><br>(! 0 1 E 0 0 : 0 0 CR LF)</td></tr>
</table>

## (5) Data Code Table

### ① Order Table of Schedule Data

1) Specific Data in accordance with Schedule No. (Schedule No.: 001 to 127)

| Order | Character String | Item | | Range of Setting | Increment/ Decrement |
|---|---|---|---|---|---|
| 1 | nnnn, | Squeeze Time | | 0000 to 9999 | 1ms |
| 2 | nnn.n, | Upslope 1 Time (NB1) | | 000.0 to 500.0 | 0.2ms |
| 3 | nnn.n, | 1st. Weld Time (NB1) | | 000.0 to 500.0 | 0.2ms |
| 4 | nnn.n, | Downslope 1 Time (NB1) | | 00.0 to 500.0 | 0.2ms |
| 5 | nn.n, | Cool Time (NB1) | | 00.0 to 99.8 | 0.2ms |
| 6 | nnn.n, | Upslope 2 Time (NB1) | | 000.0 to 500.0 | 0.2ms |
| 7 | nnn.n, | 2nd. Weld Time (NB1) | | 000.0 to 500.0 | 0.2ms |
| 8 | nnn.n, | Downslope 2 Time (NB1) | | 000.0 to 500.0 | 0.2ms |
| 9 | nnn, | Hold Time | | 000 to 999 | 1ms |
| 10 | n.nn, | WE1 Current Setting | MIN CURR: NORMAL | 0.40 to 6.00 | 0.01kA |
| | | | MIN CURR: LOW | 0.10 to 6.00 | |
| 11 | n.nn, | WE2 Current Setting | MIN CURR: NORMAL | 0.40 to 6.00 | 0.01kA |
| | | | MIN CURR: LOW | 0.10 to 6.00 | |
| 12 | n.nn, | WE1 Voltage Setting | | 0.30 to 9.99 | 0.01V |
| 13 | n.nn, | WE2 Voltage Setting | | 0.30 to 9.99 | 0.01V |
| 14 | nn.n, | WE1 Power Setting | CONTROL: POWER-H | 00.2 to 20.0 | 0.1kW |
| | | | CONTROL: POWER-L | 0.10 to 9.99 | 0.01kW |
| 15 | nn.n, | WE2 Power Setting | CONTROL: POWER-H | 00.2 to 20.0 | 0.1kW |
| | | | CONTROL: POWER-L | 0.10 to 9.99 | 0.01kW |
| 16 | n, | Transformer No. | | 1 to 5 | ---- |
| 17 | nn, | Control Method in WE1 | | 00 to 04 (NB2) | ---- |
| 18 | nn, | Control Method in WE2 | | | |
| 19 | nnnn | Squeeze Delay Time | | 0000 to 9999 | 1ms |

NB1: You can select whether or not Upslope Time and Downslope Time are included in Weld Time. If they are not included, the total time of Upslope Time, Weld Time and Downslope is up to 500 ms.

NB2: 00: CURR, 01: VOLT, 02: COMB, 03: POWER (**POWER-H**), 04: POWER (**POWER-L**)

2) Common Data

| Order | Character String | Item | Contents |
|---|---|---|---|
| 1 | nn, | Selection of Welding Transformer | 01: IT*-360*6<br>02: IT*-780*6 |
| 2 | nn, | Weld Time | 00: Slope Time Excluded<br>01: Slope Time Included |
| 3 | nn, | Selection of Start-up Condition Stabilizing Time | 00: 1ms 01: 5ms<br>02: 10ms 03: 20ms |
| 4 | nn, | Selection of Start-up Input Signal Type | 00: No Self-sustaining<br>01: Self-sustaining from Weld Time<br>02: Self-sustaining from Squeeze Time |
| 5 | nn, | Schedule Select Method | 00: Closed Circuit of Schedule Select Terminal (No Parity)<br>01: Closed Circuit of Schedule Select Terminal (Parity Valid)<br>02: Select on Front Panel |
| 6 | nn, | End Signal Output Time | 00: 10ms 01: 100ms<br>02: While Start Signal Output |
| 7 | nn, | Monitor Mode | 00: Slope Time Excluded<br>01: Slope Time Included |
| 8 | nn, | Transformer Scan Mode | 00: OFF 01: ON<br>02: 1-2 03: 1-3<br>04: 1-4 05: 1-5 |
| 9 | nn, | No-current Monitor Neglect Time | 00 to 10 (ms) |
| 10 | nn, | Pulse Width Monitor Neglect Time | 00 to 10 (ms) |
| 11 | nn, | NG Output Mode | 00: Open Circuit at NG<br>01: Closed Circuit at NG |
| 12 | nn, | READY Output Mode Setting | 00: ON at Weld ON<br>01: ON at Power ON |
| 13 | nn, | Monitor Value Calculation Mode | 00: High Rate Sampling<br>01: Low Rate Sampling, Faster Takt Time |
| 14 | nn, | Minimum Current | 00: Settable from 10% of full scale.<br>01: Settable from 2.5% of full scale. |
| 15 | nn | Displacement polarity | 00: Set the force-applying direction as plus.<br>01: Set the force-applying direction as minus. |

### ② Order Table of Monitor Data (Most Recent Monitor Value)

| Order | Output Data (n=0 to 9) | Contents | |
|---|---|---|---|
| 0001 | n.nn, | WE1 Monitor Current (Peak Value) | |
| 0002 | n.nn, | WE2 Monitor Current (Peak Value) | |
| 0003 | n.nn, | WE1 Monitor Voltage (Peak Value) | |
| 0004 | n.nn, | WE2 Monitor Voltage (Peak Value) | |
| 0005 | nn.n, (NB1) | WE1 Monitor Power | **POWER-H** Constant Power Control |
| | n.nn, | | **POWER-L** Constant Power Control |
| 0006 | nn.n, (NB1) | WE2 Monitor Power | **POWER-H** Constant Power Control |
| | n.nn, | | **POWER-L** Constant Power Control |
| 0007 | nn.n, (NB1) | WE1 Monitor Resistance | |
| 0008 | nn.n, (NB1) | WE2 Monitor Resistance | |
| 0009 | n.nn, | Precheck Monitor Current | |
| 0010 | n.nn, | WE1 Monitor Current (RMS Value) | |
| 0011 | n.nn, | WE2 Monitor Current (RMS Value) | |
| 0012 | n.nn, | WE1 Monitor Voltage (RMS Value) | |
| 0013 | n.nn, | WE2 Monitor Voltage (RMS Value) | |
| 0014 | +/-nn.nnn, | Final Displacement | |
| 0015 | nnn.n, | W1 Weld Time | |
| 0016 | nnn.n, | W2 Weld Time | |
| 0017 | +/-nn.nnn | Displacement at detecting Workpiece | |

NB1: The range between 0.0 and 9.9 is output as [SP]0.0 and [SP]9.9.

### ③ Specified Code

1) Specifying of Weld Sequence (T)

Dimension of “ms” is added to each data.

| Specified Code | Item | Range of Setting | Increment/ Decrement |
|---|---|---|---|
| T00 | Squeeze Delay Time | 0000ms to 999ms | 1ms |
| T01 | Squeeze Time | 0000ms to 999ms | 1ms |
| T02 | Upslope 1 Time | 000.0ms to 500.0ms | 0.2ms |
| T03 | 1st. Weld Time | 000.0ms to 500.0ms | 0.2ms |
| T04 | Downslope 1 Time | 000.0ms to 500.0ms | 0.2ms |
| T05 | Cool Time | 00.0ms to 99.8ms | 0.2ms |
| T06 | Upslope 2 Time | 000.0ms to 500.0ms | 0.2ms |
| T07 | 2nd. Weld Time | 000.0ms to 500.0ms | 0.2ms |
| T08 | Downslope 2 Time | 000.0ms to 500.0ms | 0.2ms |
| T13 | Hold Time | 000ms to 999ms | 1ms |
| T15 | Precheck Weld Time | 00.0ms to 10.0ms | 0.2ms |

2) Setting of Control Current, Voltage and Power (H)

| Specified Code | Item | | Range of Setting | Increment/ Decrement |
|---|---|---|---|---|
| H01 | WE1 Current Setting | NORMAL | 0.40kA to 4.00kA (**IT*-360*6**)<br>0.60kA to 6.00kA (**IT*-780*6**)<br>Bracket ( ) shows Transformer. | 0.01kA |
| | | LOW | 0.10kA to 4.00kA (**IT*-360*6**)<br>0.15kA to 6.00kA (**IT*-780*6**) | 0.01kA |
| H02 | WE2 Current Setting | NORMAL | 0.40kA to 4.00kA (**IT*-360*6**)<br>0.60kA to 6.00kA (**IT*-780*6**) | 0.01kA |
| | | LOW | 0.10kA to 4.00kA (**IT*-360*6**)<br>0.15kA to 6.00kA (**IT*-780*6**) | 0.01kA |
| H04 | WE1 Voltage Setting | | 0.30V to 9.99V | 0.01V |
| H05 | WE2 Voltage Setting | | 0.30V to 9.99V | 0.01V |
| H06 | WE1 Power Setting | | 00.2kW to 20.0kW (**POWER-H**) | 0.1kW |
| | | | 0.10kW to 9.99kW (**POWER-L**) | 0.01kW |
| H07 | WE2 Power Setting | | 00.2kW to 20.0kW (**POWER-H**) | 0.1kW |
| | | | 0.10kW to 9.99kW (**POWER-L**) | 0.01kW |
| H21 | Precheck Voltage Setting | | 0.00V to 9.99V | 0.01V |
| H50 | Transformer Number | | 1 to 5 | 1 |

3) Setting of Monitor Upper/Lower Limit (N)

| Specified Code | Item | | Range of Setting | Increment/ Decrement |
|---|---|---|---|---|
| N00 | WE1 Monitor Current Upper Limit | | 0.00kA to 9.99kA | 0.01kA |
| N01 | WE1 Monitor Current Lower Limit | | 0.00kA to 9.99kA | 0.01kA |
| N02 | WE2 Monitor Current Upper Limit | | 0.00kA to 9.99kA | 0.01kA |
| N03 | WE2 Monitor Current Lower Limit | | 0.00kA to 9.99kA | 0.01kA |
| N06 | WE1 Monitor Voltage Upper Limit | | 0.00V to 9.99V | 0.01V |
| N07 | WE1 Monitor Voltage Lower Limit | | 0.00V to 9.99V | 0.01V |
| N08 | WE2 Monitor Voltage Upper Limit | | 0.00V to 9.99V | 0.01V |
| N09 | WE2 Monitor Voltage Lower Limit | | 0.00V to 9.99V | 0.01V |
| N12 | WE1 Monitor Power Upper Limit | **POWER-H** (NB1) | 00.0kW to 99.9kW | 0.1kW |
| | | **POWER-L** (NB1) | 0.00kW to 9.99kW | 0.01kW |
| N13 | WE1 Monitor Power Lower Limit | **POWER-H** | 00.0kW to 99.9kW | 0.1kW |
| | | **POWER-L** | 0.00kW to 9.99kW | 0.01kW |
| N14 | WE2 Monitor Power Upper Limit | **POWER-H** | 00.0kW to 99.9kW | 0.1kW |
| | | **POWER-L** | 0.00kW to 9.99kW | 0.01kW |
| N15 | WE2 Monitor Power Lower Limit | **POWER-H** | 00.0kW to 99.9kW | 0.1kW |
| | | **POWER-L** | 0.00kW to 9.99kW | 0.01kW |
| N24 | WE1 Monitor Resistance Upper Limit | | 00.0m* to 99.9m* | 0.1m* (NB2) |
| N25 | WE1 Monitor Resistance Lower Limit | | 00.0m* to 99.9m* | 0.1m* |
| N26 | WE2 Monitor Resistance Upper Limit | | 00.0m* to 99.9m* | 0.1m* |
| N27 | WE2 Monitor Resistance Lower Limit | | 00.0m* to 99.9m* | 0.1m* |
| N36 | Final Displacement Upper Limit | | -29.999 to +29.999mm | 0.001mm |
| N37 | Final Displacement Lower Limit | | -29.999 to +29.999mm | 0.001mm |
| N42 | Resistance Precheck Monitor Current Upper Limit | | 0.00kA to 9.99kA | 0.01kA |
| N43 | Resistance Precheck Monitor Current Lower Limit | | 0.00kA to 9.99kA | 0.01kA |
| N65 | WE1 Weld Time Upper Limit | | 000.0ms to 500.0ms | 0.1ms |
| N66 | WE1 Weld Time Lower Limit | | 000.0ms to 500.0ms | 0.1ms |
| N67 | WE2 Weld Time Upper Limit | | 000.0ms to 500.0ms | 0.1ms |
| N68 | WE2 Weld Time Lower Limit | | 000.0ms to 500.0ms | 0.1ms |
| N70 | Setting of Current RMS/PEAK | | 0:RMS/1:PEAK | -- |
| N72 | Setting of Voltage RMS/PEAK | | 0:RMS/1:PEAK | -- |
| N73 | Displacement Delay Time | | 0 to 999ms | |
| N74 | Workpiece Detect Upper Limit | | -29.999 to +29.999mm | 0.001mm |
| N75 | Workpiece Detect Lower Limit | | | |

NB1: **POWER-H**, **POWER-L** indicates Constant Power Control.
NB2: The symbol "*" means Ω.

4) Reading of Monitor Judgment Results (J)

The function to save judging results is not equipped. Read them after each welding.

| Specified Code | Item | Contents |
|---|---|---|
| J00 | Judgment Result of Current Upper/Lower Limit | Judgment Result Data:<br>'N' means OK.<br>'L' means Lower Limit NG.<br>'H' means Upper Limit NG. |
| J03 | Judgment Result of Voltage Upper/Lower Limit | |
| J06 | Judgment Result of Power Upper/Lower Limit | |
| J12 | Judgment Result of Resistance Upper/Lower Limit | |
| J18 | Judgment Result of Final Displacement | |
| J55 | Judgment Result of Weld Time | |
| J21 | Judgment Result of Precheck Current | Judgment of Weld Workpiece Setting Status in Precheck:<br>'N' means OK.<br>'E' means NG. |
| J56 | Judgment Result of Work Detection | |
| J99 | Judgment Result (Batch Output) | Batch output of monitor judgment result |

• Batch Output of Monitor Judgment Result (Specified code: J99)

| Order | Output Data | Contents |
|---|---|---|
| 1 | n, (NB1) | Judgment Result of Current Upper/Lower Limit |
| 2 | n, (NB1) | Judgment Result of Voltage Upper/Lower Limit |
| 3 | n, (NB1) | Judgment Result of Power Upper/Lower Limit |
| 4 | n, (NB1) | Judgment Result of Resistance Upper/Lower Limit |
| 5 | n, (NB2) | Judgment Result of Precheck Current |
| 6 | n, (NB1) | Judgment Result of Final Displacement |
| 7 | n, (NB1) | Judgment Result of Weld Time |
| 8 | n (NB2) | Judgment Result of Work Detection |

NB1: Judgment Result Data: 'N' means OK, 'L' means Lower Limit NG, and 'H' means Upper Limit NG.

NB2: Judgment Result Data: 'N' means OK, and 'E' means NG.

5) Reading of Monitored Value (M)

The function to save judging results is not equipped. Read them after each welding.

| Specified Code | Item | Contents (n=0 to 9) |
|---|---|---|
| M00 | WE1 Monitor Current (PEAK Value) | n.nnkA |
| M01 | WE2 Monitor Current (PEAK Value) | n.nnkA |
| M03 | WE1 Monitor Voltage (PEAK Value) | n.nnV |
| M04 | WE2 Monitor Voltage (PEAK Value) | n.nnV |
| M06 | WE1 Monitor Power (**POWER-H**) (NB2) | nn.nkW (NB1) |
| | WE1 Monitor Power (**POWER-L**) (NB2) | n.nnkW |
| M07 | WE2 Monitor Power (**POWER-H**) (NB2) | nn.nkW (NB1) |
| | WE2 Monitor Power (**POWER-L**) (NB2) | n.nnkW |
| M12 | WE1 Monitor Resistance | nn.nm* (NB1) (NB3) |
| M13 | WE2 Monitor Resistance | nn.nm* (NB1) (NB3) |
| M18 | Final Displacement | +/-nn.nnnmm |
| M21 | Precheck Monitor Current | n.nnkA |
| M23 | WE1 Weld Time | nnn.nms |
| M24 | WE2 Weld Time | nnn.nms |
| M30 | WE1 Monitor Current (RMS Value) | n.nnkA |
| M31 | WE2 Monitor Current (RMS Value) | n.nnkA |
| M32 | WE1 Monitor Voltage (RMS Value) | n.nnV |
| M33 | WE2 Monitor Voltage (RMS Value) | n.nnV |
| M65 | Work Detecting Displacement | +/-nn.nnnmm |
| M99 | Monitor Value (Batch Output) | Batch output of monitor value |

NB1: The range between 0.0 and 9.9 is output as [SP]0.0 and [SP]9.9.
NB2: **POWER-H**, **POWER-L** indicates Constant Power Control.
NB3: The symbol "*" means Ω.

- Batch Output of Monitor Value (Specified code: M99)

| Order | Output Data (n=0 to 9) | Contents |
|---|---|---|
| 1 | n.nn, | WE1 Monitor Current (PEAK Value) |
| 2 | n.nn, | WE2 Monitor Current (PEAK Value) |
| 3 | n.nn, | WE1 Monitor Voltage (PEAK Value) |
| 4 | n.nn, | WE2 Monitor Voltage (PEAK Value) |
| 5 | nn.n, (NB1) | WE1 Monitor Power (POWER-H Constant Power Control) |
| | n.nn, | WE1 Monitor Power (POWER-L Constant Power Control) |
| 6 | nn.n, (NB1) | WE2 Monitor Power (POWER-H Constant Power Control) |
| | n.nn, | WE2 Monitor Power (POWER-L Constant Power Control) |
| 7 | nn.n, (NB1) | WE1 Monitor Resistance |
| 8 | nn.n, (NB1) | WE2 Monitor Resistance |

| Order | Output Data (n=0 to 9) | Contents |
|---|---|---|
| 9 | n.nn, | Precheck Monitor Current |
| 10 | n.nn, | WE1 Monitor Current (RMS Value) |
| 11 | n.nn, | WE2 Monitor Current (RMS Value) |
| 12 | n.nn, | WE1 Monitor Voltage (RMS Value) |
| 13 | n.nn, | WE2 Monitor Voltage (RMS Value) |
| 14 | ±nn.nnn, | Final Displacement |
| 15 | nnn.n, | WE1 Weld Time |
| 16 | nnn.n, | WE2 Weld Time |
| 17 | ±nn.nnn | Work Detecting Displacement |

NB1: The range between 0.0 and 9.9 is output as [SP]0.0 and [SP]9.9.

6) Reading of Items relating with Envelope (V)

| Specified Code | Item | Contents |
|---|---|---|
| V00 | Envelope Type | 0: Current, 1: Voltage, 2: Power, 3: Resistance, 4: Displacement |
| V01 | Interval Start Time | nnnnnms |
| V02 | Interval End Time | nnnnnms |
| V03 | Offset Upper Limit (+) | n.nnkA/n.nnV/nn.nkW/nn.nm*/ nn.nnnmm (NB1) |
| V04 | Offset Lower Limit (-) | n.nnkA/n.nnV/nn.nkW/nn.nm*/ nn.nnnmm (NB1) |
| V05 | Envelope ON/OFF | 0 : OFF, 1 : ON |

NB1: The symbol "*" means Ω.

7) Setting of Items relating with Counter (C)

| Specified Code | Item | Contents |
|---|---|---|
| C00 | Reading of Displayed Counter | |
| C14 | Counter Mode | 0: TOTAL, 1: GOOD, 2: WORK |
| C05 | Preset (TOTAL/GOOD) | 000000 to 999999 |
| C06 | Preset (WORK) | 000000 to 999999 |
| C07 | Preset (WELD) | 00 to 99 |
| C11 | Counter Reset (All Counters) | |
| C12 | Resolution of Displacement Sensor | 00.1 to 10.0um |

8) Setting of Initial Setting Condition (P)

| Specified Code | Item | Contents |
|---|---|---|
| P01 | Schedule Select Method | 00: Closed Circuit of Schedule Select Terminal (No Parity)<br>01: Closed Circuit of Schedule Select Terminal (Parity Valid)<br>02: Select on Front Panel |
| P02 | Start Signal Stabilizing Time (Delay Time) | 00: 1ms 01: 5ms<br>02: 10ms 03: 20ms |
| P03 | End Signal Output Time | 00: 10ms 01: 100ms<br>02: While Start Signal Output |
| P04 | Self-sustaining Time at Starting | 00: No Self-sustaining<br>01: Self-sustaining from Weld Time<br>02: Self-sustaining from Squeeze Time |
| P10 | Weld ON/OFF | 00: Weld OFF<br>01: Weld ON |
| P40 | Weld Transformer | 00: IT*-142*6 (Do not select)<br>01: IT*-360*6 02: IT*-780*6 |
| P41 | Monitor Value Display Mode | 00: Slope Time Excluded<br>01: Slope Time Includes |
| P43 | Transformer Scan Mode | 00: OFF 01: ON 02: 1-2<br>03: 1-3 04: 1-4 05: 1-5 |
| P45 | No-current Monitor Start Time | 00 to 10 (Dimension “ms” Eliminated) |
| P46 | Pulse Width Monitor Start Time | 00 to 10 (Dimension “ms” Eliminated) |
| P47 | NG Terminal Mode Setting | 00: Open Circuit at NG<br>01: Closed Circuit at NG |
| P48 | READY Output Mode Setting | 00: ON at Weld ON<br>01: ON at Power ON |
| P49 | Monitor Value Calculation Method | 00: Normal<br>01: Fast |
| P52 | Weld Time | 00: Slope Time Excluded<br>01: Slope Time Included |
| P60 | Minimum Current | 00: Settable from 10% of full scale.<br>01: Settable from 2.5% of full scale. |
| P61 | Displacement polarity | 00: Set the force-applying direction as plus.<br>01: Set the force-applying direction as minus. |

9) Reading of Error and Error Reset (E)

| Specified Code | Item |
|---|---|
| E00 | Error Reset |
| E99 | Error Reading |

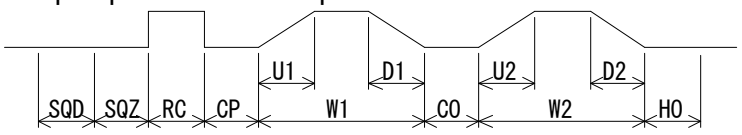
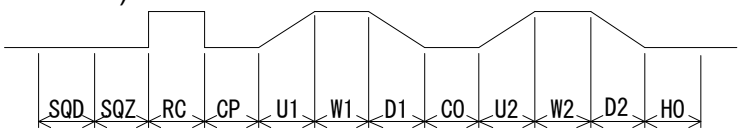
See **12. Error Codes** for details of Codes E01 to E25.

10) Control (Q)

| Specified Code | Item | Contents |
|---|---|---|
| Q00 | W1 Control Mode | 00: Constant Current<br>01: Constant Voltage<br>02: COMBI<br>03: Constant Power (**POWER-H**)<br>04: Constant Power (**POWER-L**) |
| Q01 | W2 Control Mode | |
| Q02 | Selection of W1 Weld Stop Input | 00: OFF<br>01: Displacement<br>02: Current<br>03: Voltage |
| Q03 | Selection of W2 Weld Stop Input | |
| Q04 | W1 Weld Stop Condition | n.nnkA<br>n.nnV<br>+/-nn.nnnmm |
| Q05 | W2 Weld Stop Condition | |

# 11. Specifications

## (1) Specifications

| Items | Common Specification in IPB-5000B |
|---|---|
| **Weld Current Control Method** | (1) Constant Current Control:<br>Controls so that weld current can be the set current<br>(2) Constant Voltage Control:<br>Controls so that the voltage detected at V sensing cord connected across electrodes can be the set voltage<br>(3) Constant Current/Constant Voltage Combination Control:<br>Either of both methods in which the value arrives at set value more quickly is prioritized while both Constant Current and Constant Voltage Control method work simultaneously<br>(4) Constant Power Control:<br>Controls so that power value can be the set power |
| **Rated Capacity** | 17.4kVA (**IT*-780*6** in use) |
| **Schedule Select Numbers** | 127 Schedules (1 to 127), Selected by External Signal or on Panel |
| **Timer Setting Range** | Squeeze Delay Time (SQD): 0000 to 9999ms (1ms each*)<br>* “each” represents Increment or Decrement.<br>Squeeze Time (SQZ): 0000 to 9999ms (1ms ea.)<br>PRECHECK Current (RC): 00.0 to 10.0ms (0.2ms ea.)<br>PRECHECK Judgment (CP): 1ms (Fixed)<br>Upslope 1 (U1): 000.0 to 500.0ms (0.2ms ea.)<br>Weld Time 1 (W1): 000.0 to 500.0ms (0.2ms ea.)<br>Downslope 1 (D1): 000.0 to 500.0ms (0.2ms ea.)<br>Cool Time (CO): 00.0 to 99.8ms (0.2ms ea.)<br>Upslope 2 (U2): 000.0 to 500.0ms (0.2ms ea.)<br>Weld Time 2 (W2): 000.0 to 500.0ms (0.2ms ea.)<br>Downslope 2 (D2): 000.0 to 500.0ms (0.2ms ea.)<br>Hold Time (HO): 000 to 999ms (1ms ea.)<br><br>When Upslope and Downslope are included in Weld Time.<br>  <br><br><br>When Upslope and Downslope are not included in Weld Time. (The total time of Upslope Time, Weld Time and Downslope is up to 500ms.)<br>  <br> |

<table>
<tr><th>Items</th><th>Common Specification in IPB-5000B</th></tr>
<tr><td>Current Setting Range</td><td>
<table>
<tr><th>Maximum current setting</th><th>Transformer</th><th>Setting range</th></tr>
<tr><td rowspan="2">NORMAL<br>(From 10 to 100% of Transformer maximum current)</td><td>IT*-360*6</td><td>0.40 to 4.00kA</td></tr>
<tr><td>IT*-780*6</td><td>0.60 to 6.00kA</td></tr>
<tr><td rowspan="2">LOW<br>(From 2.5 to 100% of Transformer maximum current)</td><td>IT*-360*6</td><td>0.10 to 4.00kA</td></tr>
<tr><td>IT*-780*6</td><td>0.15 to 6.00kA</td></tr>
</table>
The maximum current available for welding depends on the load such as the welding head used. When you use a general welding head, the approximate maximum current is 3000A for IT*-360*6 and 4000A for IT*-780*6. Also, in LOW mode, the set current may not flow when the current less than 400A for IT*-360*6 or 600A for IT*-780*6 is set.
</td></tr>
<tr><td>Voltage Setting Range</td><td>0.30 to 9.99V</td></tr>
<tr><td>Power Setting Range</td><td>00.2 to 20.0kW (POWER-H)<br>0.10 to 9.99kW (POWER-L)<br>* POWER-H, POWER-L indicates Constant Power Control.</td></tr>
<tr><td>Monitor</td><td>IPB-5000B holds the monitored value of all schedules (only the latest one for waveform) while the power is on.<br>When the power is turned off, all values are cleared.</td></tr>
<tr><td>Resistance<br>PRE-CHECK Function</td><td>Weld Time Setting Range: 00.0 to 10.0ms (0.2ms ea.)<br>Voltage Setting Range: 0.30 to 9.99V (0.01V ea.)<br>Current Upper/Lower Limit: 0.00 to 9.99kA (0.01kA ea.)</td></tr>
<tr><td>Monitor Upper/Lower Limit Setting Range</td><td>Current: 0.00 to 9.99kA (0.01kA ea.)<br>Voltage: 0.00 to 9.99V (0.01V ea.)<br>Power (POWER-H)*: 00.0 to 20.0kW (0.1kW ea.)<br>(POWER-L)*: 0.00 to 9.99kW (0.01kW ea.)<br>Resistance: 00.0 to 99.9mΩ (0.1mΩ ea.)<br>Weld Time: 000.0 to 500.0ms (0.2ms ea.)<br>* POWER-H, POWER-L indicates Constant Power Control.</td></tr>
<tr><td>Envelope</td><td>Upper/Lower Limit setting is possible for the only one waveform selected among Current, Voltage, Power and Resistance.</td></tr>
<tr><td>Weld Stop</td><td>When WE1 or WE2 reaches the designated value of Current or Voltage, WE1 moves to CO and WE2, to HO.<br>Setting Range of Weld Stop Current Value<br>IT*-360*6: 0.40 to 4.00kA<br>IT*-780*6: 0.60 to 6.00kA<br>Setting Range of Weld Stop Voltage Value<br>: 0.30 to 9.99V</td></tr>
</table>

| Items | Common Specification in IPB-5000B |
|---|---|
| **Counter** | Set at **COUNTER**. Count-up Output is produced when the counting arrives at Pre-set value for each mode.<br>(1) **TOTAL** (Total Counter Mode)<br>Every time the weld current is supplied, Count-up (+1 increment) is performed regardless of a judgment result.<br>Counter Pre-set Setting Range: 000000 to 999999<br>(2) **GOOD** (Good Product Counter Mode)<br>Every time GOOD is judged, Count-up is performed<br>Counter Pre-set Setting Range: 000000 to 999999<br>(3) **WORK** (Production Counter Mode)<br>Every time the counting arrives at the set value of Weld Counter, WORK Count is counted- up (+1 increment).<br>When the monitored value is judged as No Good, Count-up is not performed.<br>WELD Counter Pre-set Setting Range: 00 to 99<br>WORK Counter Pre-set Setting Range: 000000 to 999999<br>Note: The period for retaining the memory of counted numbers is approximately 10 days since the day when a power supply is turned off at latest. |
| **Start Signal Stabilizing Period** | Set at **START SIG. TIME**.<br>Weld Sequence is started after finding the set value of 1, 5, 10 or 20ms and the Start Signal. |
| **Self-sustaining Method** | Set at **START SIG. HOLD**.<br>**NO HOLD**: No self-sustaining action<br>**WE HOLD**: Self-sustaining action works from the start of current supply<br>**SQ HOLD**: Self-sustaining action works from the start of SQD |
| **Schedule Select Method** | Set at **SCHEDULE#**.<br>**EXT. (NP)**: Selected by the use of binary data<br>**EXT. (P)**: Selected by binary data with odd-numbered parity<br>**PANEL**: Selected on Panel |
| **Period for outputting END or GOOD Signal** | Set at **END SIG. TIME**.<br>Output for 10ms, 100ms or the period during which Start Signal is input (Note: if it is input 10ms or less, END or GOOD Signal is output for 10ms.).<br>**HOLD**: Output for period during which Start Signal is input<br>**10ms**: Output for 10ms<br>**100ms**: Output for 100ms |
| **Monitor Computing Range** | Set at **MONITOR MODE**.<br>**EXCLUDE SLOPE**: Computing a monitored value excluding Slope Period<br>**INCLUDE SLOPE** : Computing a monitored value including Slope Period |
| **PARITY/WE1STOP Input Selection** | Set at **SCHEDULE#**.<br>**EXT. (P)**: Parity Input at External Input Terminal Pin 14<br>**EXT. (NP)** or **PANEL**: WELD1 Stop Input at External Input Terminal Pin 14 |

| Items | Common Specification in IPB-5000B |
|---|---|
| **Starting Time of detecting No Current or No Voltage** | Set at **NO CURR MONITOR START**.<br>00 to 10ms<br>(Starts to detect No Current or Voltage after the set period) |
| **Pulse Monitoring Start Time** | Set at **PW MONITOR START**.<br>00 to 10ms (Starts the pulse monitoring after the set period) |
| **NG Output Setting** | Set at **NG OUTPUT**.<br>**NORMALLY CLOSE**: Closed with Power Supply turned on and open with NG generated<br>**NORMALLY OPEN**: Closed with NG generated |
| **READY Output Setting** | Set at **READY OUTPUT**.<br>**WELD ON**: Closed with Weld Current Supply ready<br>**POWER ON**: Closed with **IPB-5000B** turned on |
| **Accuracy of Constant Current** | +/-3%, Full Scale (Designated Condition / Fixed Load) at the case of setting and monitoring |
| **Accuracy of Constant Voltage** | +/-3%, Full Scale (Designated Condition / Fixed Load) at the case of setting and monitoring |
| **Duty Cycle** | See the duty cycle graph in the operation manual for the welding transformer in use **IT*-360*6** or **IT*-780*6**. |
| **Operation Environment** | Temperature: 5 to 40°C<br>Humidity: 90% or less (No condensation)<br>Altitude: 1000 meters or lower<br>Caution: Use this product in the environment without conductive dust. If conductive dust enters in the product, this may result in a failure, electric shock, or fire. When using this product in this environment, make contact with us. |
| **Storage Environment** | Temperature -10°–55°C and dew condensation not allowed |
| **Heat-Resistant Class** | E |
| **Case Protection** | IP20 |

| | IPB-5000B-00-00/03/07 | IPB-5000B-00-01/02/04/05 |
|---|---|---|
| **Weld Power Supply** | Three-phase, 200 to 240 V AC ±10% (50 Hz / 60 Hz)<br>(Voltage cannot be selected. Fixed to a customer-specified voltage in factory shipment.) | Three-phase, 380 to 480 V AC ±10% (50 Hz / 60 Hz)<br>(Voltage cannot be selected. Fixed to a customer-specified voltage in factory shipment.) |

| | IPB-5000B-00-00/01/03/04/07 | IPB-5000B-00-02/05 |
|---|---|---|
| **Outline dimensions (mm)** | 269 (H) x 172 (W) x 470 (D)<br>(No projections included) | 349 (H) x 172 (W) x 470 (D)<br>(No projections included) |
| **Mass (kg)** | 15 | 19 |

| | IPB-5000B-00-03/04/05 |
|---|---|
| **Displacement Measurement Range** | 30.000mm Max. |
| **Displacement Measurement Accuracy** | +/-15µm |
| **Displacement Sensor (Option)** | **GS-1830A** manufactured by Ono Sokki Co. Ltd.<br>**GS-1813A** manufactured by Ono Sokki Co. Ltd.<br>**LGK-110*** manufactured by Mitutoyo Corp. (Discontinued)<br>**LG200-110*** manufactured by Mitutoyo Corp.<br>**ST1278*** manufactured by HEIDENHAIN<br>***** An optional conversion cable is necessary. |
| **Displacement Monitor Setting Range** | Upper/Lower Limit Setting Range of Final Displacement: -29.999mm to +29.999mm (0.001mm ea.)<br>Delay Time: 0 to 999ms |
| **Workpiece Detection** | At the end of Squeeze, the displacement is checked to confirm whether or not a workpiece is set.<br>Upper/Lower Limit Setting Range of workpiece detection: -29.999mm to +29.999mm (0.001mm ea.) |
| **Weld Stop** | When WE1 or WE2 reaches the designated value of Displacement, WE1 moves to CO and WE2, to HO.<br>Displacement Setting Range of Weld Stop: -29.999mm to +29.999mm (0.001mm ea.) |
| **Envelope** | Possible to set Upper/Lower Limit Setting to Displacement waveform |

## (2) Optional Items (Separately Sold)

### ① Input Cables PK-01855-□□□

If a customer procures the cable by oneself, prepare it in accordance with the following right-hand specifications.

| Type | Branch No. | Length (m) |
|---|---|---|
| Standard | -002 | 2 |
| | -005 | 5 |
| | -010 | 10 |
| | -015 | 15 |
| | -020 | 20 |

| Specifications of Standard Cable | |
|---|---|
| Rated Voltage | 600V AC min. |
| Section Area | 8 $mm^2$ min. |
| No. of Cores | 4 |
| Cable Dia. | 25 mm max. |

| Type | Branch No. | Length (m) |
|---|---|---|
| CE Marking Compliant | -102 | 2 |
| | -105 | 5 |
| | -110 | 10 |
| | -115 | 15 |
| | -120 | 20 |

| Specifications of CE Marking Compliant Cable | |
|---|---|
| Rated Voltage | 500V AC min. |
| Section Area | 10 $mm^2$ min. |
| No. of Cores | 4 |
| Cable Dia. | 25 mm max. |
| Compliance Standard | Conductor: VDE0812/0281<br>Insulation: VDE0250/0281 |

### ② Output Cables PK-01856-□□□

If a customer procures the cable by oneself, prepare it in accordance with the following right-hand specifications.

| Type | Branch No. | Length (m) |
|---|---|---|
| Standard | -002 | 2 |
| | -005 | 5 |
| | -010 | 10 |

| Specifications of Standard Cable | |
|---|---|
| Rated Voltage | 600V AC min. |
| Section Area | 8 $mm^2$ min. |
| No. of Cores | 3 |
| Cable Dia. | 25 mm max. |

| Type | Branch No. | Length (m) |
|---|---|---|
| CE Marking Compliant | -102 | 2 |
| | -105 | 5 |
| | -110 | 10 |

| Specifications of CE Marking Compliant Cable | |
|---|---|
| Rated Voltage | 750V AC min. |
| Section Area | 10 $mm^2$ min. |
| No. of Cores | 3 |
| Cable Dia. | 25 mm max. |
| Compliance Standard | Conductor: VDE0812/0281<br>Insulation: VDE0250/0281 |

### ③ [SENS] Cables SK-05741

| Item | Branch No. | Length (m) |
|---|---|---|
| **[SENS] Cable SK-05741** | -002 | 2 |
| | -005 | 5 |
| | -010 | 10 |

### ④ Start Cables A-03081

| Item | Branch No. | Length (m) |
|---|---|---|
| **Start Cable A-03081** | -001 | 1 |
| | -002 | 3 |

### ⑤ Displacement Sensors

| Item | Manufacturer |
|---|---|
| **GS-1830A** | ONO SOKKI Co. Ltd. |
| **GS-1813A** | |
| **LGK-110** | Mitutoyo Corp. (Discontinued) |
| **LG200-110** | Mitutoyo Corp. |
| **ST1278** | HEIDENHAIN |

### ⑥ Displacement Sensor Conversion Cables

| Item | Application |
|---|---|
| **A-06037-001** | LGK-110 (Mitutoyo) |
| **SK-1213278** | LG200-110 (Mitutoyo) |
| **A-06037-002** | ST1278 (HEIDENHAIN) |

# 12. Error Codes

If the Power Supply has a trouble, the screen displays the error code and message.

| Error Code | Message | Cause | Corrective Action |
|---|---|---|---|
| **E-01** | SYSTEM ERROR | Error has been detected on control system of **IPB-5000B**. | Once turn off power and turn on again. If **E-01** SYSTEM ERROR is displayed again, repair is required.<br>Contact us. |
| **E-02** | MEMORY ERROR | Schedule data stored in memory are broken down. | Check all set data.<br>The following is assumed to cause the data stored in memory to be corrupted.<br>* Strong power noise or electrostatic noise<br>* Abnormal voltage of power supply due to thunderbolt or lightning conduction<br>* Exceed in writing count limit of flash memory<br><br>It is required to write down set values for a later use and also convenient in case of data corruption.<br>(Use attached Schedule Data Table.)<br>When turning power on along with **MENU** key pressed, the memory is initialized and all data return to values on the factory shipment after displaying the message of “Initializing.....Please wait a moment”. Re-set the values on record. It takes approximately 10 seconds to initialize the memory. Do not turn off power for the period.<br><br>If **E-02** MEMORY ERROR is displayed again, repair is required.<br>Contact us. |
| **E-03** | OVER HEAT | Temperature rises inside **IPB-5000B** and thermostat for power element inside power unit is open. | *Check whether or not duty cycle exceeds the specific value. Observe the value.<br>*Stop the operation and, after cooling the Equipment, reset the error. |
| **E-04** | OVER HEAT (TRANS) | Temperature of weld transformer rises and thermostat is open inside weld transformer. | *Check connection of [SENS] Cable.<br>*Check whether or not duty cycle exceeds the specific value. Observe the value.<br>*Stop the operation and, after cooling the Equipment, reset the error. |
| **E-05** | OVER CURRENT | Actual weld current is greater than set value. | Check whether or not weld transformer and electrodes are normal. |
| **E-06** | POWER SUPPLY ERROR | Error has been detected on three-phase weld power supply. | Check input connection of three-phase weld power supply. |

| Error Code | Contents | Cause | Corrective Action |
|---|---|---|---|
| **E-07** | ABORT | Short-circuit wire is cut between Pin 1 and Pin 3 **STOP** on rear panel. | Connect Pin 1 to Pin 3 on rear terminal strip. |
| **E-08** | NO CURRENT | Weld current is not flowing.<br>Or measured value of weld current is 3% or less of current range. | *Check the pressing force, electrode contact and wire connection of weld head.<br>*Check the setting of **SQZ**. Set longer **SQZ** period than period of electrode moving.<br>*At **NO CURR MONITOR START** in STATUS Screen, start time of checking "No Current" can be set. It is possible to stop the detection of "No Current" at the start of current flow by that setting. |
| **E-09** | NO VOLTAGE | Voltage across electrodes is 0.2V or less.<br>Or voltage detecting cable is not connected. | *Check connection and location of voltage detecting cable.<br>*Check the pressing force, electrode contact and wire connection of weld head.<br>*At **NO CURR MONITOR START** in STATUS Screen, start time of checking "No Current" can be set. It is possible to stop the detection of "No Current" at the start of current flow by that setting.<br><br>This error does not happen when **CURR** is set at **CONTROL** setting in STATUS Screen. |
| **E-11** | PARITY ERROR | Sum of numbers of closed Schedule Select Signal wires and a Parity Signal wire is not odd. | Select and close Parity Signal so that the sum of the numbers of closed Schedule Select Signal wires and a Parity Signal wire can be odd.<br>This error happens only when **EXP. (P)** is set at **SCHEDULE#** setting in STATUS Screen. |
| **E-12** | INTERRUPT ERROR | Signals of Pin 20, **W. INTERRUPT** and Pin 14, **PARITY(WE1STOP)** at terminal strip on rear panel are closed at weld starting. | Check input of **W. INTERRUPT** and **PARITY(WE1STOP)**. |
| **E-13** | CYCLE ERROR | Pin 5, **2ND STAGE** has been open on rear panel while weld sequence operates. | Close Pin 5, **2ND STAGE** until **WE2** in weld sequence goes to an end.<br>This error happens only when **NO HOLD** is set at **START SIG. HOLD** setting in STATUS Screen. |
| **E-14** | COUNT MEMORY ERROR | Count Data stored in memory are damaged. | Memory was erased because period for retaining memory of count data elapsed over specified period.<br>The period for retaining the memory of count data is approximately 10 days since the day when a power supply is turned off at latest. |

| Error Code | Contents | Cause | Corrective Action |
|---|---|---|---|
| **E-15** | PRECHECK ERROR | Current is out of range **between upper limit and lower limit** set PRECHECK Screen when PRECHECK Current Supply is used. | *Check weld pickup (contamination) of electrodes, contact of electrodes and workpieces.<br>*Check range set at PRECHECK Screen. |
| **E-16** | CURR ERROR (HIGH) | Measured weld current is out of upper limit set at COMPARATOR Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check range set at COMPARATOR Screen. |
| **E-17** | CURR ERROR (LOW) | Measured weld current is out of lower limit set at COMPARATOR Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check range set at COMPARATOR Screen. |
| **E-18** | VOLT ERROR (HIGH) | Measured voltage across electrodes is out of upper limit set at COMPARATOR Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check range set at COMPARATOR Screen. |
| **E-19** | VOLT ERROR (LOW) | Measured voltage across electrodes is out of lower limit set at COMPARATOR Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check range set at COMPARATOR Screen. |
| **E-20** | RESIST ERROR (HIGH) | Measured resistance across electrodes is out of upper limit set at COMPARATOR Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check range set at COMPARATOR Screen. |
| **E-21** | RESIST ERROR (LOW) | Measured resistance across electrodes is out of lower limit set at COMPARATOR Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check range set at COMPARATOR Screen. |
| **E-22** | POWER ERROR (HIGH) | Measured weld power is out of upper limit set at COMPARATOR Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check range set at COMPARATOR Screen. |
| **E-23** | POWER ERROR (LOW) | Measured weld power is out of lower limit set at COMPARATOR Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check range set at COMPARATOR Screen. |
| **E-24** | COUNT UP | Counting has arrived at set pre-set count value. | Re-set counter. |
| **E-25** | OVER CURRENT (24VDC) | Internal 24VDC power supply output at terminal strip on rear panel is overloaded. | Turn off power and check connection at I/O terminal strip on rear panel. |

| Error Code | Contents | Cause | Corrective Action |
|---|---|---|---|
| **E-26** | DISPLACEMENT ERROR (HIGH) | Measured displacement is out of upper limit set at CONTROL Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check range set at CONTROL Screen. |
| **E-27** | DISPLACEMENT ERROR (LOW) | Measured displacement is out of lower limit set at CONTROL Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check range set at CONTROL Screen. |
| **E-28** | WELD TIME ERROR (HIGH) | Measured weld time is out of upper limit set at CONTROL Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check weld stop setting in CONTROL Screen and weld stop input in external interface.<br>*Check range set at CONTROL Screen. |
| **E-29** | WELD TIME ERROR (LOW) | Measured weld time is out of lower limit set at CONTROL Screen. | *Check workpieces, welder and welding power supply voltage.<br>*Check weld stop setting in CONTROL Screen and weld stop input in external interface.<br>*Check range set at CONTROL Screen. |
| **E-30** | WORK DETECT ERROR | Measured displacement at end of squeeze is out of range between lower and upper limit set at CONTROL Screen. | *Check workpieces setting and positioning.<br>*Check range set at CONTROL Screen. |

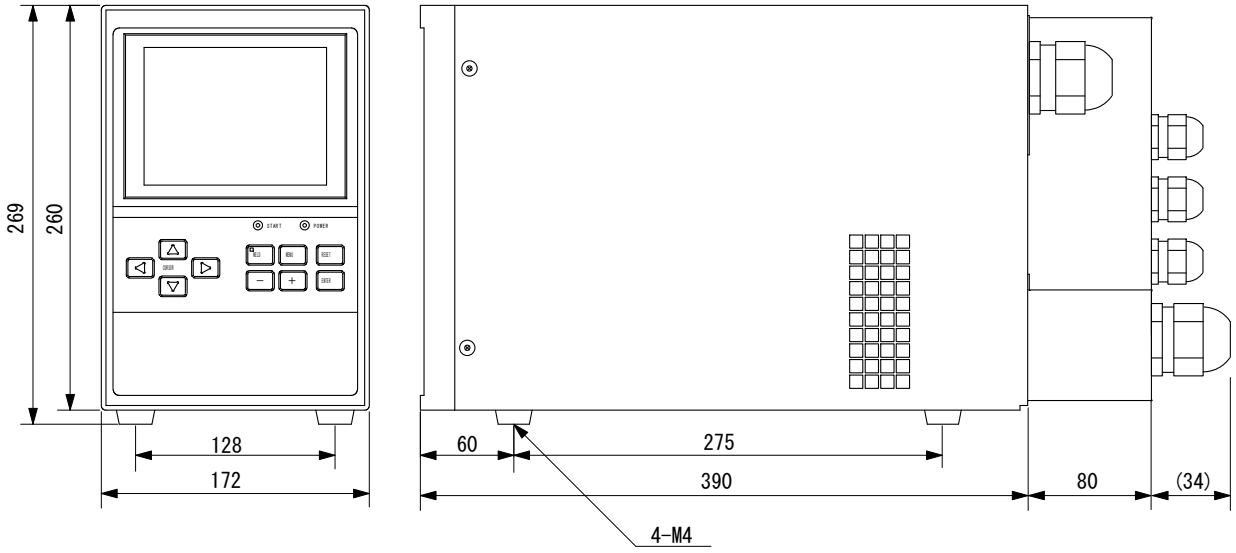
## CAUTION

If the monitor value is not displayed, the WELD ON/OFF input terminal may be open in the process of sequence (including the screen display time. See **9.(1) Fundamental Sequence**).

# 13. Outline Drawing

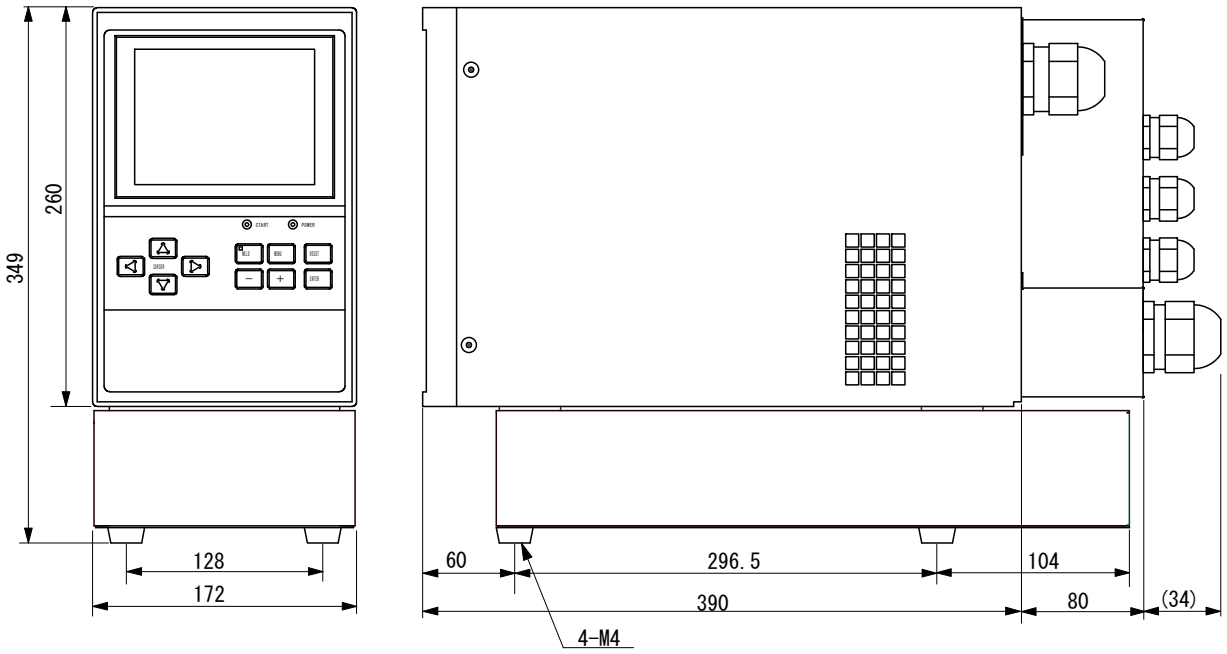
## (1) IPB-5000B-00-00/01/03/04/07

(Dimensions in mm)



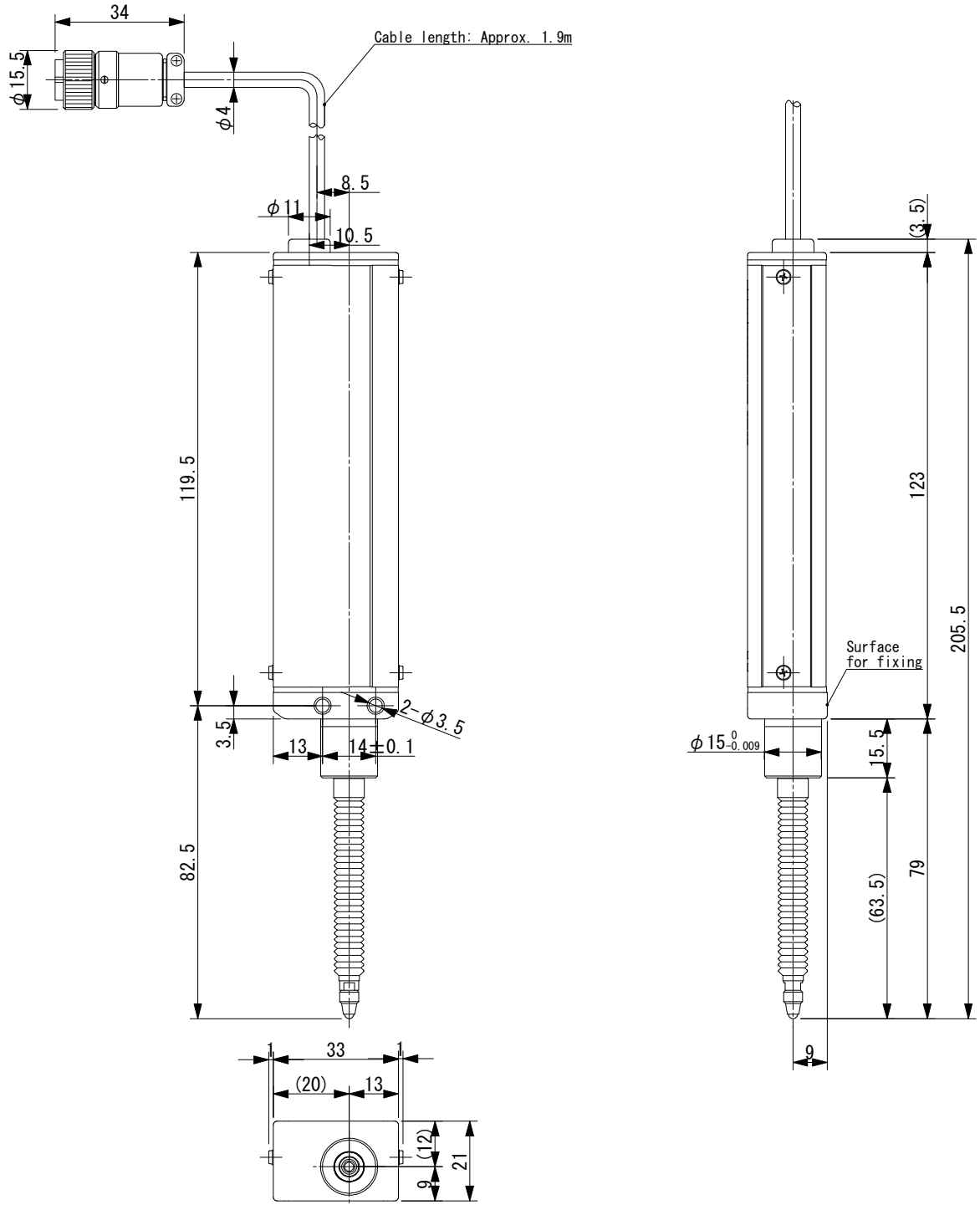

## (2) IPB-5000B-00-02/05

(Dimensions in mm)

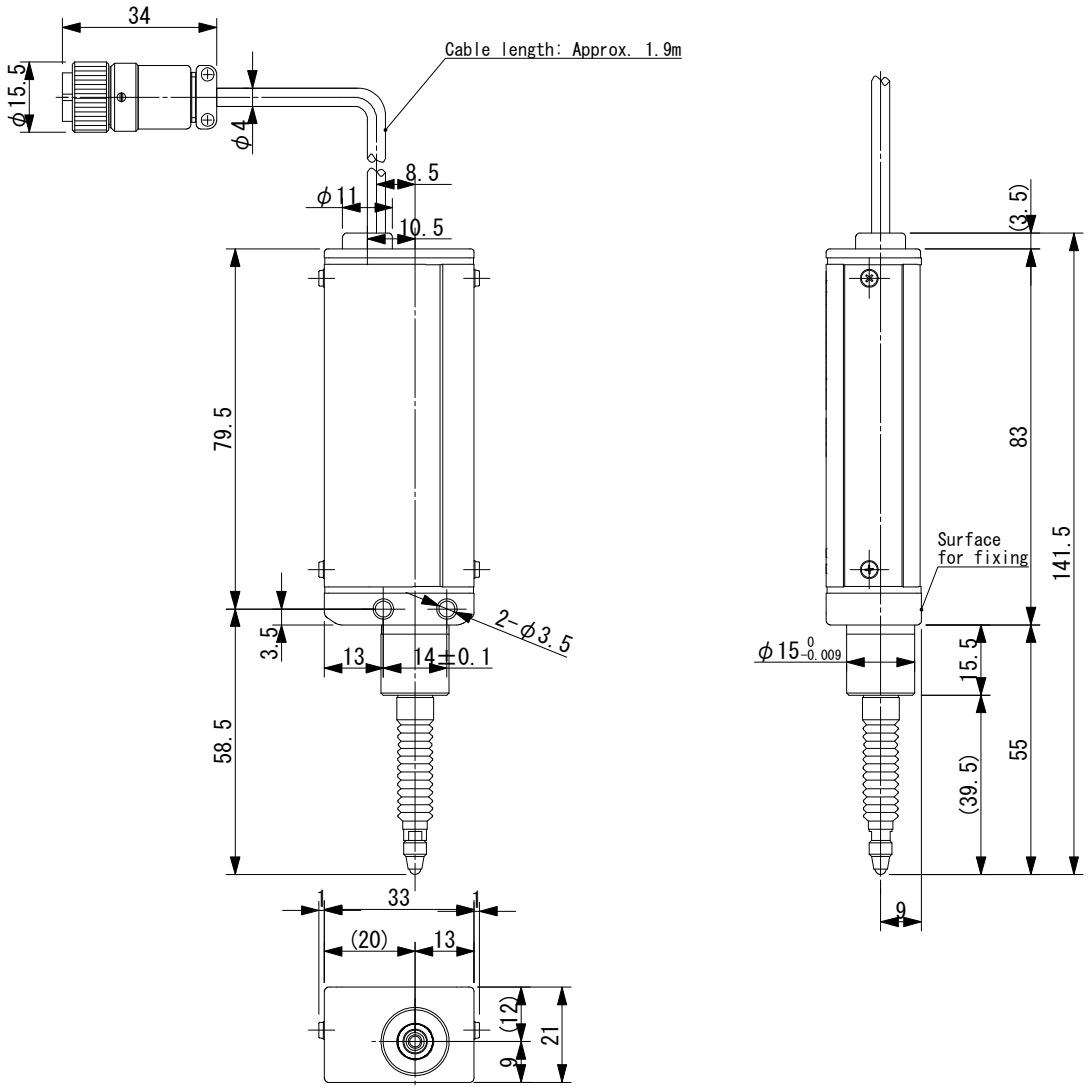


## (3) Displacement Sensors

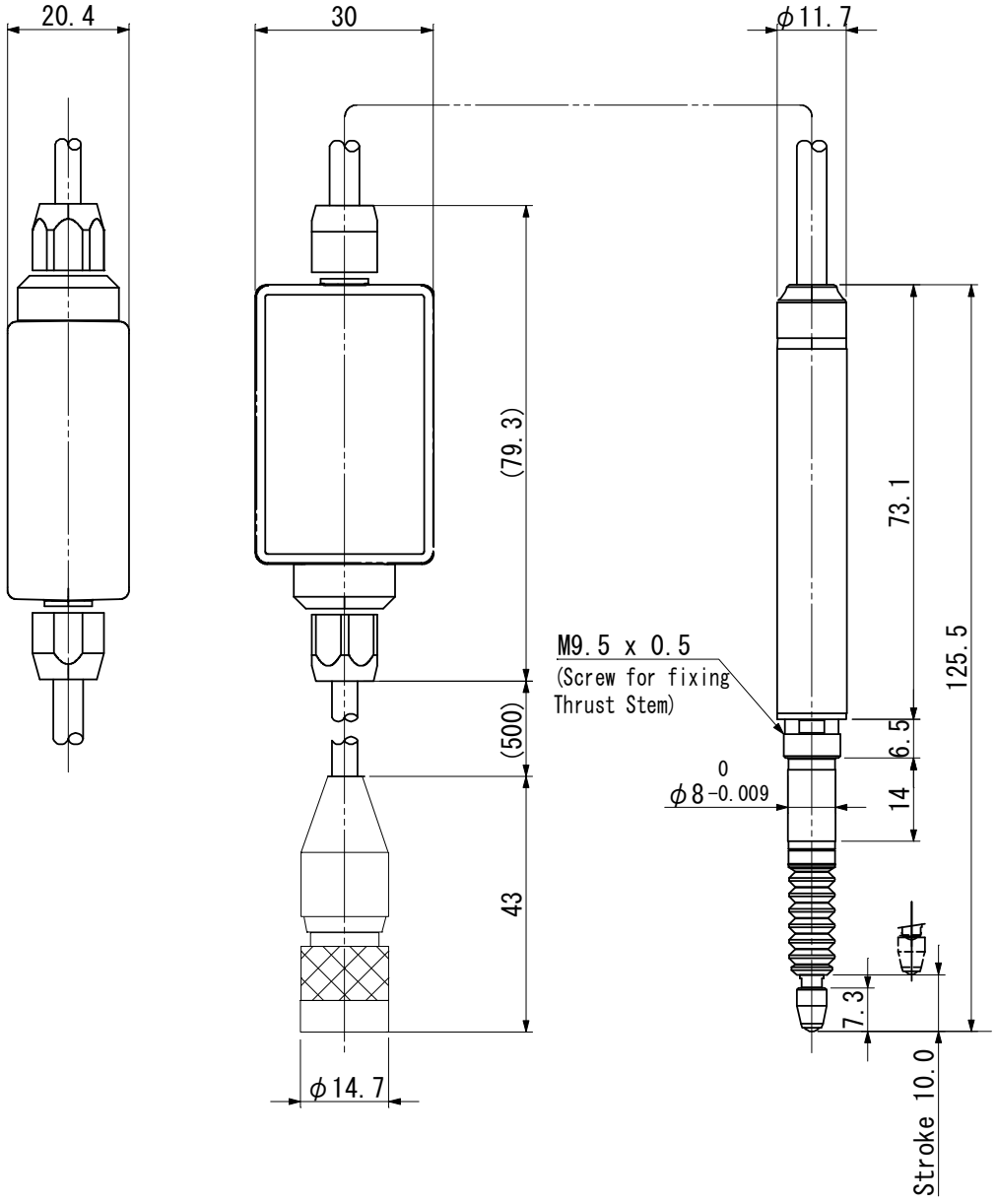
① **GS-1830A** Type, Ono Sokki



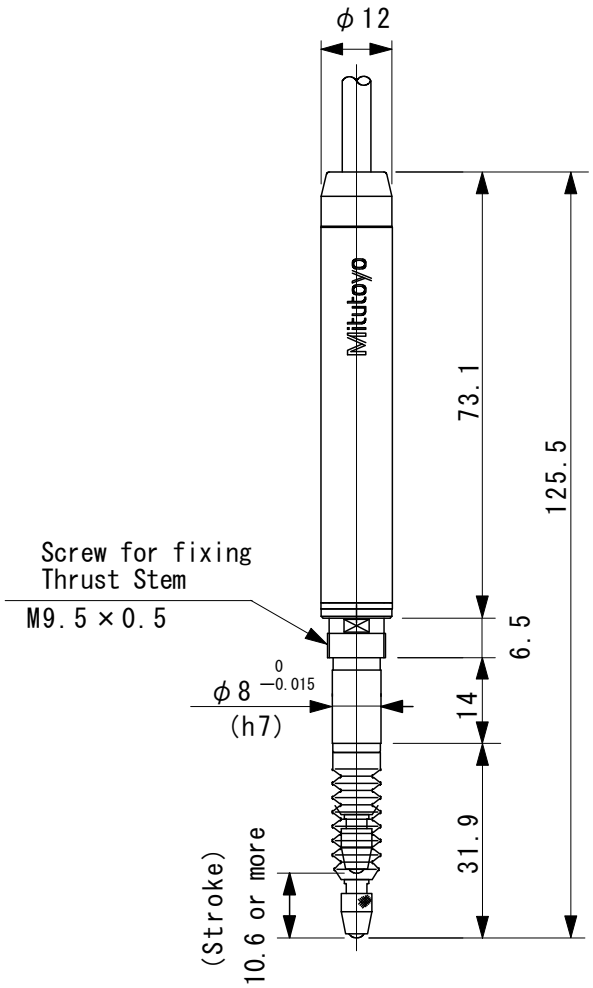
② **GS-1813A** Type, Ono Sokki



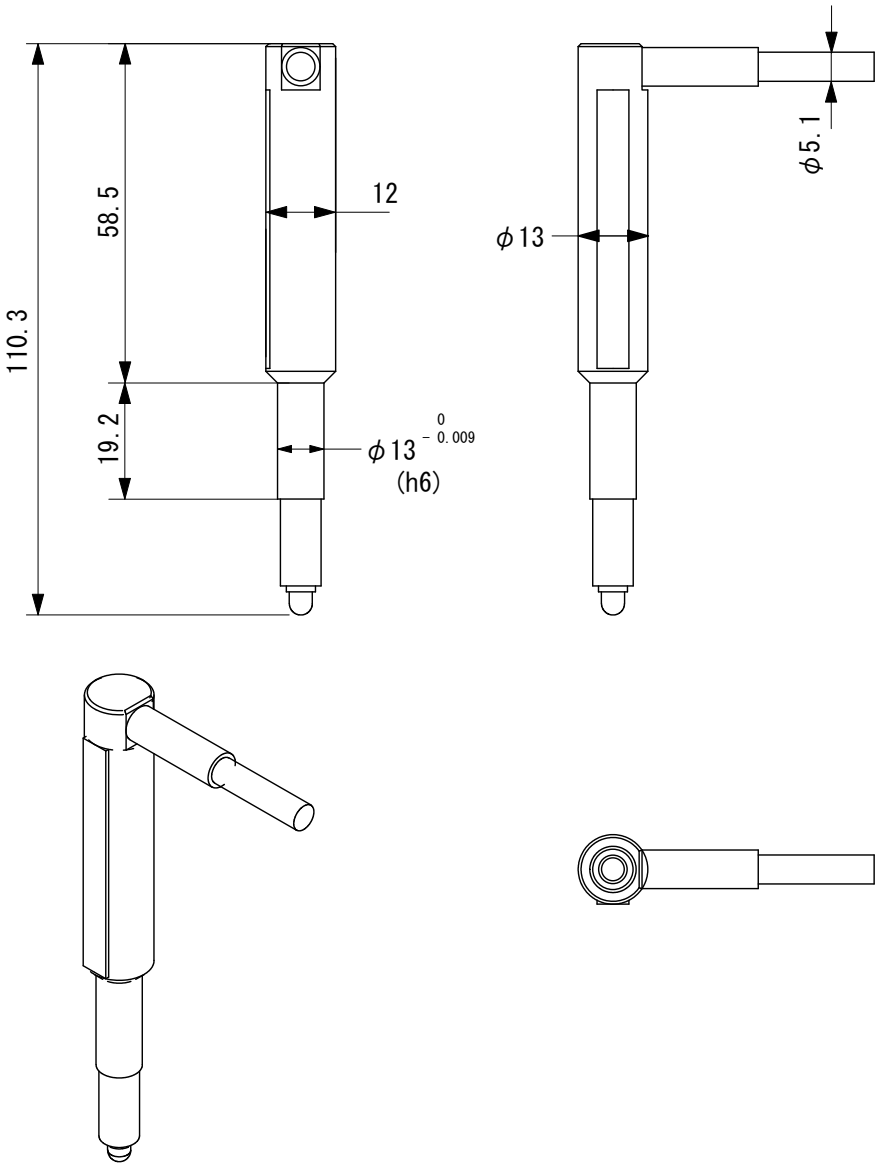
③ **LG200-110** Type, Mitutoyo



④ **LGK-110** Type, Mitutoyo (Discontinued)



⑤ **ST1278** Type, HEIDENHAIN



# 14. Schedule Data Table

## (1) Weld SCHEDULE Setting

| ITEM / SCH # | SQD | SQZ | WE1 | COOL | WE2 | HOLD | CURR WE1 | CURR WE2 | VOLT WE1 | VOLT WE2 | POWER WE1 | POWER WE2 | CONTROL WE1 | CONTROL WE2 | UP SLOPE WE1 | UP SLOPE WE2 | DOWN SLOPE WE1 | DOWN SLOPE WE2 | TRANS # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SCH1 | | | | | | | | | | | | | | | | | | | |
| SCH2 | | | | | | | | | | | | | | | | | | | |
| SCH3 | | | | | | | | | | | | | | | | | | | |
| SCH4 | | | | | | | | | | | | | | | | | | | |
| SCH5 | | | | | | | | | | | | | | | | | | | |
| SCH6 | | | | | | | | | | | | | | | | | | | |
| SCH7 | | | | | | | | | | | | | | | | | | | |
| SCH8 | | | | | | | | | | | | | | | | | | | |
| SCH9 | | | | | | | | | | | | | | | | | | | |
| SCH10 | | | | | | | | | | | | | | | | | | | |
| SCH11 | | | | | | | | | | | | | | | | | | | |
| SCH12 | | | | | | | | | | | | | | | | | | | |
| SCH13 | | | | | | | | | | | | | | | | | | | |
| SCH14 | | | | | | | | | | | | | | | | | | | |
| SCH15 | | | | | | | | | | | | | | | | | | | |
| SCH16 | | | | | | | | | | | | | | | | | | | |
| SCH17 | | | | | | | | | | | | | | | | | | | |
| SCH18 | | | | | | | | | | | | | | | | | | | |

| ITEM SCH # | SQD | SQZ | WE1 | COOL | WE2 | HOLD | CURR | | VOLT | | POWER | | CONTROL | | UP SLOPE | | DOWN SLOPE | | TRANS # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | |
| SCH19 | | | | | | | | | | | | | | | | | | | |
| SCH20 | | | | | | | | | | | | | | | | | | | |
| SCH21 | | | | | | | | | | | | | | | | | | | |
| SCH22 | | | | | | | | | | | | | | | | | | | |
| SCH23 | | | | | | | | | | | | | | | | | | | |
| SCH24 | | | | | | | | | | | | | | | | | | | |
| SCH25 | | | | | | | | | | | | | | | | | | | |
| SCH26 | | | | | | | | | | | | | | | | | | | |
| SCH27 | | | | | | | | | | | | | | | | | | | |
| SCH28 | | | | | | | | | | | | | | | | | | | |
| SCH29 | | | | | | | | | | | | | | | | | | | |
| SCH30 | | | | | | | | | | | | | | | | | | | |
| SCH31 | | | | | | | | | | | | | | | | | | | |
| SCH32 | | | | | | | | | | | | | | | | | | | |
| SCH33 | | | | | | | | | | | | | | | | | | | |
| SCH34 | | | | | | | | | | | | | | | | | | | |
| SCH35 | | | | | | | | | | | | | | | | | | | |
| SCH36 | | | | | | | | | | | | | | | | | | | |

| ITEM SCH # | SQD | SQZ | WE1 | COOL | WE2 | HOLD | CURR | | VOLT | | POWER | | CONTROL | | UP SLOPE | | DOWN SLOPE | | TRANS # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | |
| SCH37 | | | | | | | | | | | | | | | | | | | |
| SCH38 | | | | | | | | | | | | | | | | | | | |
| SCH39 | | | | | | | | | | | | | | | | | | | |
| SCH40 | | | | | | | | | | | | | | | | | | | |
| SCH41 | | | | | | | | | | | | | | | | | | | |
| SCH42 | | | | | | | | | | | | | | | | | | | |
| SCH43 | | | | | | | | | | | | | | | | | | | |
| SCH44 | | | | | | | | | | | | | | | | | | | |
| SCH45 | | | | | | | | | | | | | | | | | | | |
| SCH46 | | | | | | | | | | | | | | | | | | | |
| SCH47 | | | | | | | | | | | | | | | | | | | |
| SCH48 | | | | | | | | | | | | | | | | | | | |
| SCH49 | | | | | | | | | | | | | | | | | | | |
| SCH50 | | | | | | | | | | | | | | | | | | | |
| SCH51 | | | | | | | | | | | | | | | | | | | |
| SCH52 | | | | | | | | | | | | | | | | | | | |
| SCH53 | | | | | | | | | | | | | | | | | | | |
| SCH54 | | | | | | | | | | | | | | | | | | | |

| ITEM SCH # | SQD | SQZ | WE1 | COOL | WE2 | HOLD | CURR | | VOLT | | POWER | | CONTROL | | UP SLOPE | | DOWN SLOPE | | TRANS # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | |
| SCH55 | | | | | | | | | | | | | | | | | | | |
| SCH56 | | | | | | | | | | | | | | | | | | | |
| SCH57 | | | | | | | | | | | | | | | | | | | |
| SCH58 | | | | | | | | | | | | | | | | | | | |
| SCH59 | | | | | | | | | | | | | | | | | | | |
| SCH60 | | | | | | | | | | | | | | | | | | | |
| SCH61 | | | | | | | | | | | | | | | | | | | |
| SCH62 | | | | | | | | | | | | | | | | | | | |
| SCH63 | | | | | | | | | | | | | | | | | | | |
| SCH64 | | | | | | | | | | | | | | | | | | | |
| SCH65 | | | | | | | | | | | | | | | | | | | |
| SCH66 | | | | | | | | | | | | | | | | | | | |
| SCH67 | | | | | | | | | | | | | | | | | | | |
| SCH68 | | | | | | | | | | | | | | | | | | | |
| SCH69 | | | | | | | | | | | | | | | | | | | |
| SCH70 | | | | | | | | | | | | | | | | | | | |
| SCH71 | | | | | | | | | | | | | | | | | | | |
| SCH72 | | | | | | | | | | | | | | | | | | | |

| ITEM SCH # | SQD | SQZ | WE1 | COOL | WE2 | HOLD | CURR | | VOLT | | POWER | | CONTROL | | UP SLOPE | | DOWN SLOPE | | TRANS # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | |
| SCH73 | | | | | | | | | | | | | | | | | | | |
| SCH74 | | | | | | | | | | | | | | | | | | | |
| SCH75 | | | | | | | | | | | | | | | | | | | |
| SCH76 | | | | | | | | | | | | | | | | | | | |
| SCH77 | | | | | | | | | | | | | | | | | | | |
| SCH78 | | | | | | | | | | | | | | | | | | | |
| SCH79 | | | | | | | | | | | | | | | | | | | |
| SCH80 | | | | | | | | | | | | | | | | | | | |
| SCH81 | | | | | | | | | | | | | | | | | | | |
| SCH82 | | | | | | | | | | | | | | | | | | | |
| SCH83 | | | | | | | | | | | | | | | | | | | |
| SCH84 | | | | | | | | | | | | | | | | | | | |
| SCH85 | | | | | | | | | | | | | | | | | | | |
| SCH86 | | | | | | | | | | | | | | | | | | | |
| SCH87 | | | | | | | | | | | | | | | | | | | |
| SCH88 | | | | | | | | | | | | | | | | | | | |
| SCH89 | | | | | | | | | | | | | | | | | | | |
| SCH90 | | | | | | | | | | | | | | | | | | | |

| ITEM / SCH # | SQD | SQZ | WE1 | COOL | WE2 | HOLD | CURR | | VOLT | | POWER | | CONTROL | | UP SLOPE | | DOWN SLOPE | | TRANS # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | |
| SCH91 | | | | | | | | | | | | | | | | | | | |
| SCH92 | | | | | | | | | | | | | | | | | | | |
| SCH93 | | | | | | | | | | | | | | | | | | | |
| SCH94 | | | | | | | | | | | | | | | | | | | |
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| SCH102 | | | | | | | | | | | | | | | | | | | |
| SCH103 | | | | | | | | | | | | | | | | | | | |
| SCH104 | | | | | | | | | | | | | | | | | | | |
| SCH105 | | | | | | | | | | | | | | | | | | | |
| SCH106 | | | | | | | | | | | | | | | | | | | |
| SCH107 | | | | | | | | | | | | | | | | | | | |
| SCH108 | | | | | | | | | | | | | | | | | | | |

| ITEM SCH # | SQD | SQZ | WE1 | COOL | WE2 | HOLD | CURR | | VOLT | | POWER | | CONTROL | | UP SLOPE | | DOWN SLOPE | | TRANS # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | WE1 | WE2 | |
| SCH109 | | | | | | | | | | | | | | | | | | | |
| SCH110 | | | | | | | | | | | | | | | | | | | |
| SCH111 | | | | | | | | | | | | | | | | | | | |
| SCH112 | | | | | | | | | | | | | | | | | | | |
| SCH113 | | | | | | | | | | | | | | | | | | | |
| SCH114 | | | | | | | | | | | | | | | | | | | |
| SCH115 | | | | | | | | | | | | | | | | | | | |
| SCH116 | | | | | | | | | | | | | | | | | | | |
| SCH117 | | | | | | | | | | | | | | | | | | | |
| SCH118 | | | | | | | | | | | | | | | | | | | |
| SCH119 | | | | | | | | | | | | | | | | | | | |
| SCH120 | | | | | | | | | | | | | | | | | | | |
| SCH121 | | | | | | | | | | | | | | | | | | | |
| SCH122 | | | | | | | | | | | | | | | | | | | |
| SCH123 | | | | | | | | | | | | | | | | | | | |
| SCH124 | | | | | | | | | | | | | | | | | | | |
| SCH125 | | | | | | | | | | | | | | | | | | | |
| SCH126 | | | | | | | | | | | | | | | | | | | |
| SCH127 | | | | | | | | | | | | | | | | | | | |

## (2) PRECHECK Setting

| ITEM / SCH# | TIME | VOLT | COMP CURR | |
|---|---|---|---|---|
| | | | HI | LO |
| SCH1 | | | | |
| SCH2 | | | | |
| SCH3 | | | | |
| SCH4 | | | | |
| SCH5 | | | | |
| SCH6 | | | | |
| SCH7 | | | | |
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| SCH25 | | | | |
| SCH26 | | | | |
| SCH27 | | | | |

| ITEM / SCH# | TIME | VOLT | COMP CURR | |
|---|---|---|---|---|
| | | | HI | LO |
| SCH28 | | | | |
| SCH29 | | | | |
| SCH30 | | | | |
| SCH31 | | | | |
| SCH32 | | | | |
| SCH33 | | | | |
| SCH34 | | | | |
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| SCH50 | | | | |
| SCH51 | | | | |
| SCH52 | | | | |
| SCH53 | | | | |
| SCH54 | | | | |

| ITEM SCH# | TIME | VOLT | COMP CURR | |
|---|---|---|---|---|
| | | | HI | LO |
| SCH55 | | | | |
| SCH56 | | | | |
| SCH57 | | | | |
| SCH58 | | | | |
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| SCH80 | | | | |
| SCH81 | | | | |
| SCH82 | | | | |
| SCH83 | | | | |

| ITEM SCH# | TIME | VOLT | COMP CURR | |
|---|---|---|---|---|
| | | | HI | LO |
| SCH84 | | | | |
| SCH85 | | | | |
| SCH86 | | | | |
| SCH87 | | | | |
| SCH88 | | | | |
| SCH89 | | | | |
| SCH90 | | | | |
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| SCH108 | | | | |
| SCH109 | | | | |
| SCH110 | | | | |
| SCH111 | | | | |
| SCH112 | | | | |

| ITEM / SCH# | TIME | VOLT | COMP CURR | |
|---|---|---|---|---|
| | | | HI | LO |
| SCH113 | | | | |
| SCH114 | | | | |
| SCH115 | | | | |
| SCH116 | | | | |
| SCH117 | | | | |
| SCH118 | | | | |
| SCH119 | | | | |
| SCH120 | | | | |

| ITEM / SCH# | TIME | VOLT | COMP CURR | |
|---|---|---|---|---|
| | | | HI | LO |
| SCH121 | | | | |
| SCH122 | | | | |
| SCH123 | | | | |
| SCH124 | | | | |
| SCH125 | | | | |
| SCH126 | | | | |
| SCH127 | | | | |
| | | | | |

## (3) COMPARATOR Setting

| ITEM | CURR | | | | | VOLT | | | | | POWER | | | | RESIST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WE1 | | WE2 | | RMS/PEAK | WE1 | | WE2 | | RMS/PEAK | WE1 | | WE2 | | WE1 | | WE2 | |
| SCH # | HI | LO | HI | LO | | HI | LO | HI | LO | | HI | LO | HI | LO | HI | LO | HI | LO |
| SCH1 | | | | | | | | | | | | | | | | | | |
| SCH2 | | | | | | | | | | | | | | | | | | |
| SCH3 | | | | | | | | | | | | | | | | | | |
| SCH4 | | | | | | | | | | | | | | | | | | |
| SCH5 | | | | | | | | | | | | | | | | | | |
| SCH6 | | | | | | | | | | | | | | | | | | |
| SCH7 | | | | | | | | | | | | | | | | | | |
| SCH8 | | | | | | | | | | | | | | | | | | |
| SCH9 | | | | | | | | | | | | | | | | | | |
| SCH10 | | | | | | | | | | | | | | | | | | |
| SCH11 | | | | | | | | | | | | | | | | | | |
| SCH12 | | | | | | | | | | | | | | | | | | |
| SCH13 | | | | | | | | | | | | | | | | | | |
| SCH14 | | | | | | | | | | | | | | | | | | |
| SCH15 | | | | | | | | | | | | | | | | | | |
| SCH16 | | | | | | | | | | | | | | | | | | |
| SCH17 | | | | | | | | | | | | | | | | | | |
| SCH18 | | | | | | | | | | | | | | | | | | |

| ITEM | CURR | | | | | VOLT | | | | | POWER | | | | RESIST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | WE1 | | WE2 | |
| SCH # | HI | LO | HI | LO | | HI | LO | HI | LO | | HI | LO | HI | LO | HI | LO | HI | LO |
| SCH19 | | | | | | | | | | | | | | | | | | |
| SCH20 | | | | | | | | | | | | | | | | | | |
| SCH21 | | | | | | | | | | | | | | | | | | |
| SCH22 | | | | | | | | | | | | | | | | | | |
| SCH23 | | | | | | | | | | | | | | | | | | |
| SCH24 | | | | | | | | | | | | | | | | | | |
| SCH25 | | | | | | | | | | | | | | | | | | |
| SCH26 | | | | | | | | | | | | | | | | | | |
| SCH27 | | | | | | | | | | | | | | | | | | |
| SCH28 | | | | | | | | | | | | | | | | | | |
| SCH29 | | | | | | | | | | | | | | | | | | |
| SCH30 | | | | | | | | | | | | | | | | | | |
| SCH31 | | | | | | | | | | | | | | | | | | |
| SCH32 | | | | | | | | | | | | | | | | | | |
| SCH33 | | | | | | | | | | | | | | | | | | |
| SCH34 | | | | | | | | | | | | | | | | | | |
| SCH35 | | | | | | | | | | | | | | | | | | |
| SCH36 | | | | | | | | | | | | | | | | | | |

| ITEM | CURR | | | | | VOLT | | | | | POWER | | | | RESIST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | WE1 | | WE2 | |
| SCH # | HI | LO | HI | LO | | HI | LO | HI | LO | | HI | LO | HI | LO | HI | LO | HI | LO |
| SCH37 | | | | | | | | | | | | | | | | | | |
| SCH38 | | | | | | | | | | | | | | | | | | |
| SCH39 | | | | | | | | | | | | | | | | | | |
| SCH40 | | | | | | | | | | | | | | | | | | |
| SCH41 | | | | | | | | | | | | | | | | | | |
| SCH42 | | | | | | | | | | | | | | | | | | |
| SCH43 | | | | | | | | | | | | | | | | | | |
| SCH44 | | | | | | | | | | | | | | | | | | |
| SCH45 | | | | | | | | | | | | | | | | | | |
| SCH46 | | | | | | | | | | | | | | | | | | |
| SCH47 | | | | | | | | | | | | | | | | | | |
| SCH48 | | | | | | | | | | | | | | | | | | |
| SCH49 | | | | | | | | | | | | | | | | | | |
| SCH50 | | | | | | | | | | | | | | | | | | |
| SCH51 | | | | | | | | | | | | | | | | | | |
| SCH52 | | | | | | | | | | | | | | | | | | |
| SCH53 | | | | | | | | | | | | | | | | | | |
| SCH54 | | | | | | | | | | | | | | | | | | |

| ITEM | CURR | | | | | VOLT | | | | | POWER | | | | RESIST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | WE1 | | WE2 | |
| SCH # | HI | LO | HI | LO | | HI | LO | HI | LO | | HI | LO | HI | LO | HI | LO | HI | LO |
| SCH55 | | | | | | | | | | | | | | | | | | |
| SCH56 | | | | | | | | | | | | | | | | | | |
| SCH57 | | | | | | | | | | | | | | | | | | |
| SCH58 | | | | | | | | | | | | | | | | | | |
| SCH59 | | | | | | | | | | | | | | | | | | |
| SCH60 | | | | | | | | | | | | | | | | | | |
| SCH61 | | | | | | | | | | | | | | | | | | |
| SCH62 | | | | | | | | | | | | | | | | | | |
| SCH63 | | | | | | | | | | | | | | | | | | |
| SCH64 | | | | | | | | | | | | | | | | | | |
| SCH65 | | | | | | | | | | | | | | | | | | |
| SCH66 | | | | | | | | | | | | | | | | | | |
| SCH67 | | | | | | | | | | | | | | | | | | |
| SCH68 | | | | | | | | | | | | | | | | | | |
| SCH69 | | | | | | | | | | | | | | | | | | |
| SCH70 | | | | | | | | | | | | | | | | | | |
| SCH71 | | | | | | | | | | | | | | | | | | |
| SCH72 | | | | | | | | | | | | | | | | | | |

| ITEM | CURR | | | | | VOLT | | | | | POWER | | | | RESIST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | WE1 | | WE2 | |
| SCH # | HI | LO | HI | LO | | HI | LO | HI | LO | | HI | LO | HI | LO | HI | LO | HI | LO |
| SCH73 | | | | | | | | | | | | | | | | | | |
| SCH74 | | | | | | | | | | | | | | | | | | |
| SCH75 | | | | | | | | | | | | | | | | | | |
| SCH76 | | | | | | | | | | | | | | | | | | |
| SCH77 | | | | | | | | | | | | | | | | | | |
| SCH78 | | | | | | | | | | | | | | | | | | |
| SCH79 | | | | | | | | | | | | | | | | | | |
| SCH80 | | | | | | | | | | | | | | | | | | |
| SCH81 | | | | | | | | | | | | | | | | | | |
| SCH82 | | | | | | | | | | | | | | | | | | |
| SCH83 | | | | | | | | | | | | | | | | | | |
| SCH84 | | | | | | | | | | | | | | | | | | |
| SCH85 | | | | | | | | | | | | | | | | | | |
| SCH86 | | | | | | | | | | | | | | | | | | |
| SCH87 | | | | | | | | | | | | | | | | | | |
| SCH88 | | | | | | | | | | | | | | | | | | |
| SCH89 | | | | | | | | | | | | | | | | | | |
| SCH90 | | | | | | | | | | | | | | | | | | |

| ITEM | CURR | | | | | VOLT | | | | | POWER | | | | RESIST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | WE1 | | WE2 | |
| SCH # | HI | LO | HI | LO | | HI | LO | HI | LO | | HI | LO | HI | LO | HI | LO | HI | LO |
| SCH91 | | | | | | | | | | | | | | | | | | |
| SCH92 | | | | | | | | | | | | | | | | | | |
| SCH93 | | | | | | | | | | | | | | | | | | |
| SCH94 | | | | | | | | | | | | | | | | | | |
| SCH95 | | | | | | | | | | | | | | | | | | |
| SCH96 | | | | | | | | | | | | | | | | | | |
| SCH97 | | | | | | | | | | | | | | | | | | |
| SCH98 | | | | | | | | | | | | | | | | | | |
| SCH99 | | | | | | | | | | | | | | | | | | |
| SCH100 | | | | | | | | | | | | | | | | | | |
| SCH101 | | | | | | | | | | | | | | | | | | |
| SCH102 | | | | | | | | | | | | | | | | | | |
| SCH103 | | | | | | | | | | | | | | | | | | |
| SCH104 | | | | | | | | | | | | | | | | | | |
| SCH105 | | | | | | | | | | | | | | | | | | |
| SCH106 | | | | | | | | | | | | | | | | | | |
| SCH107 | | | | | | | | | | | | | | | | | | |
| SCH108 | | | | | | | | | | | | | | | | | | |

| ITEM | CURR | | | | | VOLT | | | | | POWER | | | | RESIST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | RMS/ PEAK | WE1 | | WE2 | | WE1 | | WE2 | |
| SCH # | HI | LO | HI | LO | | HI | LO | HI | LO | | HI | LO | HI | LO | HI | LO | HI | LO |
| SCH109 | | | | | | | | | | | | | | | | | | |
| SCH110 | | | | | | | | | | | | | | | | | | |
| SCH111 | | | | | | | | | | | | | | | | | | |
| SCH112 | | | | | | | | | | | | | | | | | | |
| SCH113 | | | | | | | | | | | | | | | | | | |
| SCH114 | | | | | | | | | | | | | | | | | | |
| SCH115 | | | | | | | | | | | | | | | | | | |
| SCH116 | | | | | | | | | | | | | | | | | | |
| SCH117 | | | | | | | | | | | | | | | | | | |
| SCH118 | | | | | | | | | | | | | | | | | | |
| SCH119 | | | | | | | | | | | | | | | | | | |
| SCH120 | | | | | | | | | | | | | | | | | | |
| SCH121 | | | | | | | | | | | | | | | | | | |
| SCH122 | | | | | | | | | | | | | | | | | | |
| SCH123 | | | | | | | | | | | | | | | | | | |
| SCH124 | | | | | | | | | | | | | | | | | | |
| SCH125 | | | | | | | | | | | | | | | | | | |
| SCH126 | | | | | | | | | | | | | | | | | | |
| SCH127 | | | | | | | | | | | | | | | | | | |

## (4) CONTROL Setting

** Only for model with displacement sensor (Option)

| ITEM | WELD STOP | | | | WELD TIME | | | | DISPLACEMENT ** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INPUT | | CONDITION | | WE1 | | WE2 | | COMP | | DELAY TIME | WORK DETECT |
| SCH # | WE1 | WE2 | WE1 | WE2 | HI | LO | HI | LO | HI | LO | | HI | LO |
| SCH1 | | | | | | | | | | | | | |
| SCH2 | | | | | | | | | | | | | |
| SCH3 | | | | | | | | | | | | | |
| SCH4 | | | | | | | | | | | | | |
| SCH5 | | | | | | | | | | | | | |
| SCH6 | | | | | | | | | | | | | |
| SCH7 | | | | | | | | | | | | | |
| SCH8 | | | | | | | | | | | | | |
| SCH9 | | | | | | | | | | | | | |
| SCH10 | | | | | | | | | | | | | |
| SCH11 | | | | | | | | | | | | | |
| SCH12 | | | | | | | | | | | | | |
| SCH13 | | | | | | | | | | | | | |
| SCH14 | | | | | | | | | | | | | |
| SCH15 | | | | | | | | | | | | | |
| SCH16 | | | | | | | | | | | | | |
| SCH17 | | | | | | | | | | | | | |
| SCH18 | | | | | | | | | | | | | |

** Only for model with displacement sensor (Option)

| ITEM | WELD STOP | | | | WELD TIME | | | | DISPLACEMENT ** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INPUT | | CONDITION | | WE1 | | WE2 | | COMP | | DELAY TIME | WORK DETECT | |
| SCH # | WE1 | WE2 | WE1 | WE2 | HI | LO | HI | LO | HI | LO | | HI | LO |
| SCH19 | | | | | | | | | | | | | |
| SCH20 | | | | | | | | | | | | | |
| SCH21 | | | | | | | | | | | | | |
| SCH22 | | | | | | | | | | | | | |
| SCH23 | | | | | | | | | | | | | |
| SCH24 | | | | | | | | | | | | | |
| SCH25 | | | | | | | | | | | | | |
| SCH26 | | | | | | | | | | | | | |
| SCH27 | | | | | | | | | | | | | |
| SCH28 | | | | | | | | | | | | | |
| SCH29 | | | | | | | | | | | | | |
| SCH30 | | | | | | | | | | | | | |
| SCH31 | | | | | | | | | | | | | |
| SCH32 | | | | | | | | | | | | | |
| SCH33 | | | | | | | | | | | | | |
| SCH34 | | | | | | | | | | | | | |
| SCH35 | | | | | | | | | | | | | |
| SCH36 | | | | | | | | | | | | | |

** Only for model with displacement sensor (Option)

| ITEM | WELD STOP | | | | WELD TIME | | | | DISPLACEMENT ** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INPUT | | CONDITION | | WE1 | | WE2 | | COMP | | DELAY TIME | WORK DETECT | |
| SCH # | WE1 | WE2 | WE1 | WE2 | HI | LO | HI | LO | HI | LO | | HI | LO |
| SCH37 | | | | | | | | | | | | | |
| SCH38 | | | | | | | | | | | | | |
| SCH39 | | | | | | | | | | | | | |
| SCH40 | | | | | | | | | | | | | |
| SCH41 | | | | | | | | | | | | | |
| SCH42 | | | | | | | | | | | | | |
| SCH43 | | | | | | | | | | | | | |
| SCH44 | | | | | | | | | | | | | |
| SCH45 | | | | | | | | | | | | | |
| SCH46 | | | | | | | | | | | | | |
| SCH47 | | | | | | | | | | | | | |
| SCH48 | | | | | | | | | | | | | |
| SCH49 | | | | | | | | | | | | | |
| SCH50 | | | | | | | | | | | | | |
| SCH51 | | | | | | | | | | | | | |
| SCH52 | | | | | | | | | | | | | |
| SCH53 | | | | | | | | | | | | | |
| SCH54 | | | | | | | | | | | | | |

** Only for model with displacement sensor (Option)

| ITEM | WELD STOP | | | | WELD TIME | | | | DISPLACEMENT ** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INPUT | | CONDITION | | WE1 | | WE2 | | COMP | | DELAY TIME | WORK DETECT | |
| SCH # | WE1 | WE2 | WE1 | WE2 | HI | LO | HI | LO | HI | LO | | HI | LO |
| SCH55 | | | | | | | | | | | | | |
| SCH56 | | | | | | | | | | | | | |
| SCH57 | | | | | | | | | | | | | |
| SCH58 | | | | | | | | | | | | | |
| SCH59 | | | | | | | | | | | | | |
| SCH60 | | | | | | | | | | | | | |
| SCH61 | | | | | | | | | | | | | |
| SCH62 | | | | | | | | | | | | | |
| SCH63 | | | | | | | | | | | | | |
| SCH64 | | | | | | | | | | | | | |
| SCH65 | | | | | | | | | | | | | |
| SCH66 | | | | | | | | | | | | | |
| SCH67 | | | | | | | | | | | | | |
| SCH68 | | | | | | | | | | | | | |
| SCH69 | | | | | | | | | | | | | |
| SCH70 | | | | | | | | | | | | | |
| SCH71 | | | | | | | | | | | | | |
| SCH72 | | | | | | | | | | | | | |

** Only for model with displacement sensor (Option)

| ITEM | WELD STOP | | | | WELD TIME | | | | DISPLACEMENT ** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INPUT | | CONDITION | | WE1 | | WE2 | | COMP | | DELAY TIME | WORK DETECT | |
| SCH # | WE1 | WE2 | WE1 | WE2 | HI | LO | HI | LO | HI | LO | | HI | LO |
| SCH73 | | | | | | | | | | | | | |
| SCH74 | | | | | | | | | | | | | |
| SCH75 | | | | | | | | | | | | | |
| SCH76 | | | | | | | | | | | | | |
| SCH77 | | | | | | | | | | | | | |
| SCH78 | | | | | | | | | | | | | |
| SCH79 | | | | | | | | | | | | | |
| SCH80 | | | | | | | | | | | | | |
| SCH81 | | | | | | | | | | | | | |
| SCH82 | | | | | | | | | | | | | |
| SCH83 | | | | | | | | | | | | | |
| SCH84 | | | | | | | | | | | | | |
| SCH85 | | | | | | | | | | | | | |
| SCH86 | | | | | | | | | | | | | |
| SCH87 | | | | | | | | | | | | | |
| SCH88 | | | | | | | | | | | | | |
| SCH89 | | | | | | | | | | | | | |
| SCH90 | | | | | | | | | | | | | |

** Only for model with displacement sensor (Option)

| ITEM | WELD STOP | | | | WELD TIME | | | | DISPLACEMENT ** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INPUT | | CONDITION | | WE1 | | WE2 | | COMP | | DELAY TIME | WORK DETECT | |
| SCH # | WE1 | WE2 | WE1 | WE2 | HI | LO | HI | LO | HI | LO | | HI | LO |
| SCH91 | | | | | | | | | | | | | |
| SCH92 | | | | | | | | | | | | | |
| SCH93 | | | | | | | | | | | | | |
| SCH94 | | | | | | | | | | | | | |
| SCH95 | | | | | | | | | | | | | |
| SCH96 | | | | | | | | | | | | | |
| SCH97 | | | | | | | | | | | | | |
| SCH98 | | | | | | | | | | | | | |
| SCH99 | | | | | | | | | | | | | |
| SCH100 | | | | | | | | | | | | | |
| SCH101 | | | | | | | | | | | | | |
| SCH102 | | | | | | | | | | | | | |
| SCH103 | | | | | | | | | | | | | |
| SCH104 | | | | | | | | | | | | | |
| SCH105 | | | | | | | | | | | | | |
| SCH106 | | | | | | | | | | | | | |
| SCH107 | | | | | | | | | | | | | |
| SCH108 | | | | | | | | | | | | | |

** Only for model with displacement sensor (Option)

| ITEM | WELD STOP | | | | WELD TIME | | | | DISPLACEMENT ** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INPUT | | CONDITION | | WE1 | | WE2 | | COMP | | DELAY TIME | WORK DETECT | |
| SCH # | WE1 | WE2 | WE1 | WE2 | HI | LO | HI | LO | HI | LO | | HI | LO |
| SCH109 | | | | | | | | | | | | | |
| SCH110 | | | | | | | | | | | | | |
| SCH111 | | | | | | | | | | | | | |
| SCH112 | | | | | | | | | | | | | |
| SCH113 | | | | | | | | | | | | | |
| SCH114 | | | | | | | | | | | | | |
| SCH115 | | | | | | | | | | | | | |
| SCH116 | | | | | | | | | | | | | |
| SCH117 | | | | | | | | | | | | | |
| SCH118 | | | | | | | | | | | | | |
| SCH119 | | | | | | | | | | | | | |
| SCH120 | | | | | | | | | | | | | |
| SCH121 | | | | | | | | | | | | | |
| SCH122 | | | | | | | | | | | | | |
| SCH123 | | | | | | | | | | | | | |
| SCH124 | | | | | | | | | | | | | |
| SCH125 | | | | | | | | | | | | | |
| SCH126 | | | | | | | | | | | | | |
| SCH127 | | | | | | | | | | | | | |

## (5) STATUS Setting

**STATUS**

| | |
|---|---|
| WELD TRANS | |
| WELD TIME | |
| START SIG.TIME | |
| START SIG.HOLD | |
| SCHEDULE# | |
| END SIG.TIME | |
| MONITOR MODE | |
| CALCULATION MODE | |
| TRANS SCAN MODE | |
| COMM CONTROL | |
| COMM MODE | |
| COMM UNIT# | |
| COMM SPEED | |
| NO CURR MONITOR START | |
| PW MONITOR START | |
| NG OUTPUT | |
| READY OUTPUT | |

**ERROR SETTING**

| | |
|---|---|
| E08 :NO CURRENT | |
| E09 :NO VOLTAGE | |
| E16/E17:OUT LIMIT OF CURR | |
| E18/E19:OUT LIMIT OF VOLT | |
| E20/E21:OUT LIMIT OF POWER | |
| E22/E23:OUT LIMIT OF RESIST | |
| E26/E27:OUT LIMIT OF DISPLC | |
| E28/E29:OUT LIMIT OF TIME | |
| E15/E30:WORK CHECK ERROR | |

**MISC**

| | |
|---|---|
| TRANS USER1 | |
| DISPLACEMENT SENSOR STEP | |
| COUNTER | |
| PRESET (TOTAL/GOOD) | |
| PRESET (WORK) | |
| PRESET (WELD) | |