

Welbee Fieldbus Connection Tool

Function Specification

For WB-T500P / WB-A350P / WB-A500P / WB-F300P / PJ-TIG

WELDING PRODUCTS DIVISION
DAIHEN CORPORATION

1. Outline

This specification describes the construction of the interface, which can be mounted to the WB Series welding power source, and defines the communication specifications for performing communication with external devices such as robot controllers using Fieldbus.

- TIG welding DC power source: WB-T500P
- TIG welding AC DC dual-use power source: WB-A350P / WB-A500P
- Plasma welding DC power source: WB-F300P
- Plasma Jet TIG (PJ-TIG)

2. Configuration

Welbee Fieldbus Connection Tool corresponds to the following communication standards. The type of Welbee Fieldbus Connection Tool is different depending on the adopted communication standard.

Fieldbus	Type of Welbee Fieldbus Connection Tool
EtherNet/IP	IFR-800EI
PROFIBUS-DP	IFR-800PB
DeviceNet	IFR-800DN
PROFINET-IRT	IFR-800PN

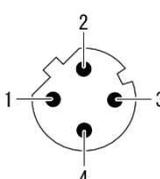
3. Specifications of Network communication

3.1 Fieldbus Specification

The welding power source connected with the fieldbus operates as a slave, sending and receiving 32-byte I/O data. Details depending on communication standard are described below.

3.1.1 Ethernet/IP Specifications

(1) Basic Specifications

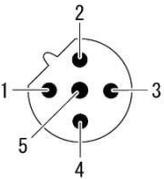
Communication standard	Ethernet/IP												
Bandwidth	10/100 Mbps												
Connector	IEC 61076-2-101, M12, 4-pin, D-coded, Female <div style="display: flex; align-items: center; justify-content: center;">  <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+TX</td> </tr> <tr> <td>2</td> <td>+RX</td> </tr> <tr> <td>3</td> <td>-TX</td> </tr> <tr> <td>4</td> <td>-RX</td> </tr> <tr> <td>Housing</td> <td>Shield</td> </tr> </tbody> </table> </div>	Pin	Signal	1	+TX	2	+RX	3	-TX	4	-RX	Housing	Shield
Pin	Signal												
1	+TX												
2	+RX												
3	-TX												
4	-RX												
Housing	Shield												
IP address	Default setting: 192.168.0.2 To change the IP address, it is necessary to connect a personal computer on which a special software is installed with the welding power source by Ethernet (refer to the Owner's Manual of Welbee Fieldbus Connection Tool).												
Connection	I/O connection only supported, operates as target												

(2) I/O Connection Specifications

Communication cycle	Recommended: 5 to 200 ms
Target parameter from originator	Instance ID: 150 Data size: 32 bytes Run/idle header: yes
Originator parameter from target	Instance ID: 100 Data size: 32 bytes Run/idle header: no
Vender ID	Follows the information of the Anybus Communicator AB7072 made by HMS Vendor ID: 005Ah

3.1.2 PROFIBUS Specifications

(1) Basic Specifications

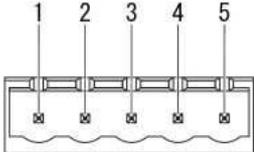
Communication standard	PROFIBUS-DP														
Baudrate	Supports all common baudrates up to 12Mbit (detected automatically)														
Connector	IEC 61076-2-101, M12, 5-pin, B-coded, Female  <table border="1" data-bbox="845 1012 1243 1294"> <thead> <tr> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-</td> </tr> <tr> <td>2</td> <td>A Line (Green)</td> </tr> <tr> <td>3</td> <td>-</td> </tr> <tr> <td>4</td> <td>B Line (Red)</td> </tr> <tr> <td>5</td> <td>-</td> </tr> <tr> <td>Housing</td> <td>Shield</td> </tr> </tbody> </table>	Pin	Signal	1	-	2	A Line (Green)	3	-	4	B Line (Red)	5	-	Housing	Shield
Pin	Signal														
1	-														
2	A Line (Green)														
3	-														
4	B Line (Red)														
5	-														
Housing	Shield														
Node address	Default setting: 77 Setting can be done with the configuration switch of Anybus Communicator AB7000 (refer to the Owner's Manual of Welbee Fieldbus Connection Tool).														
Connection	I/O connection only supported, operates as slave														

(2) I/O Connection Specifications

Communication cycle	Recommended: 5 to 200 ms
Data size	32 bytes IN/OUT

3.1.3 DeviceNet Specifications

(1) Basic Specifications

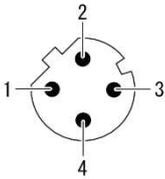
Communication standard	DeviceNet												
Baudrate	Default setting: 500kbps Setting can be done with the configuration switch of Anybus Communicator AB7001 (refer to the Owner's Manual of Welbee Fieldbus Connection Tool).												
Connector	Use MSTB 2,5/5-ST-5,08 AU made by PHOENIX CONTACT. Or use an equivalent product.  <table border="1" data-bbox="911 595 1310 837"> <thead> <tr> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>V-</td> </tr> <tr> <td>2</td> <td>CAN L</td> </tr> <tr> <td>3</td> <td>Shield</td> </tr> <tr> <td>4</td> <td>CAN H</td> </tr> <tr> <td>5</td> <td>V+</td> </tr> </tbody> </table>	Pin	Signal	1	V-	2	CAN L	3	Shield	4	CAN H	5	V+
Pin	Signal												
1	V-												
2	CAN L												
3	Shield												
4	CAN H												
5	V+												
Node address	Default setting: 1 Setting can be done with the configuration switch of Anybus Communicator AB7001 (refer to the Owner's Manual of Welbee Fieldbus Connection Tool).												
Connection	I/O connection only supported, operates as slave												

(2) I/O Connection Specifications

Communication cycle	Recommended: 5 to 200 ms
Data size	32 bytes IN/OUT

3.1.4 PROFINET-IRT Specifications

(1) Basic Specifications

Communication standard	PROFINET-IRT												
Bandwidth	10/100 Mbps												
Connector	IEC 61076-2-101, M12, 4-pin, D-coded, Female  <table border="1" data-bbox="847 1597 1246 1839"> <thead> <tr> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+TX</td> </tr> <tr> <td>2</td> <td>+RX</td> </tr> <tr> <td>3</td> <td>-TX</td> </tr> <tr> <td>4</td> <td>-RX</td> </tr> <tr> <td>Housing</td> <td>Shield</td> </tr> </tbody> </table>	Pin	Signal	1	+TX	2	+RX	3	-TX	4	-RX	Housing	Shield
Pin	Signal												
1	+TX												
2	+RX												
3	-TX												
4	-RX												
Housing	Shield												
IP address	Default setting: 192.168.0.2 To change the IP address, it is necessary to connect a personal computer on which a special software is installed with the welding power source by Ethernet (refer to the Owner's Manual of Welbee Fieldbus Connection Tool).												
Connection	I/O connection only supported, operates as slave												

(2) I/O Connection Specifications

Communication cycle	Recommended: 5 to 200 ms
Data size	32 bytes IN/OUT
Vendor ID	Follows the information of the Anybus Communicator AB7078 made by HMS Vendor ID: 005Ah

3.2 Processing Time of Communication Data

The following explains the processing time of the welding power source concerning the change of I/O data in Fieldbus communication.

When an external device changes a single function by the I/O data, it takes approximately 20 ms until the change is reflected to the welding power source after the data reception is completed in the welding power source. When changes are made to two or more functions, it takes approximately 50 ms at maximum until all changes are reflected. (*1, *2)

When the welding power source sends I/O data, the status of the welding power source at the time before [Communication cycle waiting time (*3)]+approx. 20 ms against the sending start timing is reflected to the data. (*1)

- *1 Delay may increase temporarily according to the CPU loaded conditions of the welding power source.
- *2 When hardware operation is conducted by "Welding startup" and "Gas discharge", etc. , additional delay will occur by the time the hardware starts working.
- *3 For instance, 0-10 ms communication cycle waiting time will occur when the communication interval of the I/O data is set to 10 ms.

(2) IN Data List

Byte offset	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
0	Watchdog	Gas purging *F *PJ	Plasma gas discharging*F / Inner gas discharging*PJ	Welding detected *TA / Pilot starting *F	Shield gas discharging	Retract	Inching	Welding starting
1	Error	Warning	Draining*F	Welding detection result *TA / Pilot completed *F	Keyhole detected *F	Inverter output	READY	WCR
2	Welding condition memory no. (signed 8-bit integer)							
3	Setting change permission	0	0	0	0	0	Condition memory write	Condition memory load
4	AC Waveform (unsigned 3-bit integer)*A			Welding method (unsigned 3-bit integer)			0	
5	Maximum current (unsigned 3-bit integer) *F			Feed mode (unsigned 3-bit integer)			Touch start *TA	Pulse
6	Pilot current (signed 8-bit integer) *F							
7	Cleaning width (signed 8-bit integer) *A							
8	Measured value being displayed	0	0	0	0	0	0	0
9	During standby: Welding current setting value / During welding: Welding current measured value (signed 16-bit integer)							
10								
11	During standby: Wire feed speed setting value / During welding: Wire feed speed measured value (signed 16-bit integer)							
12								
13	During standby: Peak current setting value / During welding: Welding voltage measured value (signed 16-bit integer)							
14								
15	0							
16	Pulse frequency (signed 16-bit integer)							
17								
18	Display change	Function (port 1) No. (unsigned 7-bit integer)						
19	Function (port 1) setting value (signed 16-bit integer)							
20								
21	Display change	Function (port 2) No. (unsigned 7-bit integer)						
22	Function (port 2) setting value (signed 16-bit integer)							
23								
24	Display change	Function (port 3) No. (unsigned 7-bit integer)						
25	Function (port 3) setting value (signed 16-bit integer)							
26								
27	Display change	Function (port 4) No. (unsigned 7-bit integer)						
28	Function (port 4) setting value (signed 16-bit integer)							
29								
30	Error code (signed 16-bit integer)							
31								

(3) Handling of Integers

The data format for the data integers such as "signed 16-bit integer" in the data lists is as follows.

(i) Bit order and byte order

The bit order and byte order are as shown in the following example (general little-endian system).

Ex.: To set 3500(decimal number) = 0x0DAC(hexadecimal) in the 16-bit region of offset 9-10, set as shown below.

To MSB←								→To LSB							
offset 10 (larger offset)								offset 9 (smaller offset)							
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
0	0	0	0	1	1	0	1	1	0	1	0	1	1	0	0
0				D				A				C			

(ii) Handling of negative numbers

Negative numbers are handled using two's-complement notation. For example, using "signed 8-bit integers", -1 is 0xFF, and -128 is 0x80.

4.2 Out Data simplified table

The out data information transmitted from the external device (master side) to the welding power supply (slave side) is simply shown. For details, refer to “4.4 I / O data details”.

offset	bit	Function	Description
0	0	Welding start	1: start welding 0: stop welding
0	1	Inching	1: start inching 0: stop inching
0	2	Retract	1: start retracting 0: stop retracting
0	3	Gas purge	1: start gas purge 0: stop gas purge
0	4	Welding detection	1: start detecting 0: stop detecting
0	7	Watchdog	1: “1” setting 0: “0” setting
1	7	Operation stop	1: operation stop 0: operation stop releas
2	-	Welding condition memory no.	0: current welding conditions 1 to 100: welding conditions memory number
3	0	memory load	1: execute loading 0: no operation
3	1	memory write	1: execute writing 0: no operation
3	7	Setting change permission	1: permission 0: prohibition
4	2-4	WELDING METHOD	Selects a welding method.
5	0	Pulse control	1: valid 0: invalid
9-10	-	Welding current	Sets the welding current.
11-12	-	Wire feed speed	Sets the wire feed speed.
13-14	-	Peak current	Sets the pulse peak current.
16-17	-	Pulse frequency	Sets the pulse frequency.
18/21	-	Function(port1 to 4) No.	Setting function number.
/24/27	0-6	Function(port1 to 4) display change	Function value display switching.
19-20 /22-23 /25-26 /28-29	-	Function(port1 to 4) setting value	Setting function values.

4.3 OUT data setting example

The following is an example of a setting method for replacing each operation on the welding machine with transmission data (OUT data) from an external device.

operation	Setting method
Perform a gas check.	Setting offset 0 / bit 3 to "1" starts gas purge. Setting offset 0 / bit 3 to "0" stops gas purge.
Perform inching feeding of wire.	Setting offset 0 / bit 1 to "1" starts inching. Setting offset 0 / bit 1 to "0" stops inching.
Perform welding.	Setting offset 0 / bit 0 to "1" starts welding. Setting offset 0 / bit 0 to "0" stops welding.
Stop operation	Setting offset 0 / bit 7 to "1" stops operation. Setting offset 0 / bit 7 to "0" releases the operation stop.

The following operations can be changed only when the setting change from an external device is permitted. Setting change is permitted by setting offset 3 / bit 7 to "1" and prohibited by setting offset 3 / bit 7 to "0".

Set the welding method.	When setting the welding method to "DC TIG", set offset 4/bit 2-4 to "0".
Set the pulse control.	When setting the pulse control to "valid", set offset 5/bit 0 to "1".
Set the welding current.	When setting the welding current to "150A", set offset 9-10 to "1500(=0x05DC)". (offset 9: 0xDC, offset 10: 0x05)
Set the pulse peakcurrent.	When setting the pulse peak current to "350A", set offset 13-14 to "3500(=0x0DAC)". (offset 13: 0xAC, offset 14: 0x0D)
Set the pulse frequency.	When setting the pulse frequency to "20Hz", set offset 16-17 to "200 (=0x00C8)". (offset 16: 0xC8, offset 17: 0x00)
Set the function.	When setting the F45(special crater sequence) to "ON", set offset 18 to "45 (=0.2D)". And set offset 19-20 to "1(=0x0001)". (offset 19: 0x01, offset 20: 0x00)

4.4 I/O Data Details

(1) OUT Data Details

offset	bit	Function	Description
0	0	Welding start	Operates as welding starting being ON when 1. Does not work if inching or retracting are operating ahead.
0	1	Inching	Operates as inching or retracting being ON when 1. However, Inching and retracting do not work if welding starting is operating ahead. Also, when both inching and retracting are 1, neither will be performed.
0	2	Retract	
0	3	Shield gas purge	Operates as shield gas purge being ON when 1. Gas will be discharged during welding startup regardless of whether gas discharge is ON/OFF.
0	4	Welding detection*TA (for TIG) / Pilot start *F (for Plasma)	The welding detection function using auxiliary power becomes ON when this value is set to 1 (for TIG). Does not work during welding startup. Also, welding starting is given priority over welding detection when welding starting is set to 1 and welding detection stops./ Operates as pilot start being ON when 1 is set (for Plasma).
0	5	Plasma gas discharge *F (for Plasma) / Inner gas discharge *PJ (for PJ-TIG)	Operates as Plasma gas discharge being ON when 1 is set. Gas discharge is done regardless of the ON/OFF status of gas discharge during pilot start. (for Plasma). / Operates as Inner gas discharge being ON when 1 is set. Gas discharge is done regardless of the ON/OFF status of gas discharge during welding. (for PJ-TIG).
0	6	Gas purge *F *PJ	Operates as gas purge being ON when 1 is set.
0	7	Watchdog	Used as the watchdog signal. This bit must alternate writing between 0 and 1 every 0.5 seconds. When the watchdog signal is not operating, data other than for stopping operation will not be accepted. If this bit does not change for more than 1 second, the welding machine will have an error stop. However, if the watchdog signal is not operating when the welding machine is started or recovers from an error stop, the welding machine will output a warning, and the error stop will not re-occur. The warning will be canceled when the watchdog signal begins operating.
1	5	Drainage *F	Operates as drainage being ON when 1 is set.
1	7	Operation stop/ reset error	When 1, the welding power source stops operating, and the error code is reset with E-000. When 1 is returned to 0, errors and warnings are cleared, and the welding power source resumes operation. However, as shown in appendix 1, welding power source system errors and control power errors cannot be reset. In such cases, the power to the welding power source must be shut off and then restored.
2	-	Welding condition memory no.	Set when using the memory function of welding conditions (refer to the Owner's Manual, 6.5 "Memory Function of Welding Conditions"). When this function will not be used, set the value to 0. Setting a welding condition memory number 1 through 100 will set that number's corresponding saved welding condition to IN data offset 4-29 (the saved welding condition can be checked, but this operation by itself does not load the saved welding condition). Setting the welding condition memory number to 0 will return offset 4-29 of the IN data to the currently enabled setting.

offset	bit	Function	Description										
3	0	Welding condition memory load	<p>Setting the welding condition memory load to 1 will load the welding condition of the number set to the welding condition memory number.</p> <p>However, note that if the setting change permission of offset 3/bit 7 is set to 1, immediately after the welding condition is loaded, the setting values for offset 4 and greater will be applied as the currently enabled settings. When using to load welding condition memory, normally set the setting change permission to 0.</p> <p>When both welding condition memory load and welding condition memory write are set to 1, both operations are disabled.</p>										
3	1	Welding condition memory write	<p>Setting the welding condition memory write to 1 will write the currently enabled welding condition to the number set to the welding condition memory number.</p> <p>When both welding condition memory load and welding condition memory write are set to 1, both operations are disabled.</p>										
3	7	Setting change permission	<p>When this bit is 1, the setting values of offset 4 and greater are applied to the welding machine. When this bit is 0, the setting values of offset 4 and greater are ignored by the welding machine.</p> <p>However, function numbers of offsets 18, 21, 24, and 27 are not parameters that are changes for the welding machine, and so they are always recognized. For example, when the setting change permission is 0, and offset 18 (function (port 1) no.) is set, the values of offsets 19 and 20 (function (port 1) setting value) will not be applied to the welding machine, but the function values already set to the welding machine will be output to the IN data offsets 19 and 20.</p>										
4	2-4	Welding method	<p>Selects a welding method as shown on the following table according to the set value. However, no setting is made when no welding method exists. Manual welding is disabled during Fieldbus communication (for a compatible model).</p> <table border="1"> <thead> <tr> <th>Set value</th> <th>Welding method</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>DC TIG</td> </tr> <tr> <td>1</td> <td>AC TIG</td> </tr> <tr> <td>2</td> <td>AC-DC TIG</td> </tr> <tr> <td>3</td> <td>Plasma</td> </tr> </tbody> </table>	Set value	Welding method	0	DC TIG	1	AC TIG	2	AC-DC TIG	3	Plasma
Set value	Welding method												
0	DC TIG												
1	AC TIG												
2	AC-DC TIG												
3	Plasma												
4	5-7	AC waveform *A	<p>Selects a AC waveform as shown on the following table according to the set value.</p> <table border="1"> <thead> <tr> <th>Set value</th> <th>AC waveform</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Standard</td> </tr> <tr> <td>1</td> <td>Soft</td> </tr> <tr> <td>2</td> <td>Hard</td> </tr> </tbody> </table>	Set value	AC waveform	0	Standard	1	Soft	2	Hard		
Set value	AC waveform												
0	Standard												
1	Soft												
2	Hard												
5	0	Pulse	When 1 is set, the pulse control is set ON.										
5	1	Touch start *TA	When 1 is set, the touch start control is set ON.										

offset	bit	Function	Description												
5	2-4	Feed mode	<p>Enters a feed mode as shown on the following table according to the set value. This function is valid only when Feed function is being used.</p> <table border="1"> <thead> <tr> <th>Set value</th> <th>Feed mode</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No feed</td> </tr> <tr> <td>1</td> <td>Intermittent feed</td> </tr> <tr> <td>2</td> <td>Continuous feed</td> </tr> <tr> <td>3</td> <td>Pulse synchronized feed</td> </tr> <tr> <td>4</td> <td>AC synchronized feed</td> </tr> </tbody> </table>	Set value	Feed mode	0	No feed	1	Intermittent feed	2	Continuous feed	3	Pulse synchronized feed	4	AC synchronized feed
Set value	Feed mode														
0	No feed														
1	Intermittent feed														
2	Continuous feed														
3	Pulse synchronized feed														
4	AC synchronized feed														
6	-	Pilot current *F	Sets the pilot current. The unit of the setting is [A].												
7	-	Cleaning width *A	Sets the cleaning width. The unit of the setting is [%].												
9-10	-	Welding current	Sets the welding current. The unit of the setting is [0.1 A].												
11-12	-	Wire feed speed	Sets the wire feed speed. The unit of the setting is [cm/min]. Note that this function is valid only when Feed function is being used.												
13-14	-	Peak current	Sets the peak current. The unit of the setting is [0.1 A].												
16-17	-	Pulse frequency	Sets the pulse frequency. The unit of the setting is [0.1 Hz].												
18	0-6	Function (port 1) No.	<p>Settings apart from offsets 4 through 17 are set here. There are 4 setting ports, so up to 4 settings can be changed simultaneously. Specifies the setting item by function number. Nothing will be specified when 0 is set. Setting 1 through 99 specifies the internal function (refer to the Owner's Manual, 6.1.3 "Internal function") with the same function number. Functions other than these are also available. For details, refer to "4.4 Functions".</p> <p>Specifies the setting value of the item specified by the function number of the function setting value. In ON/OFF settings, 1 is ON, and 0 is OFF.</p> <p>When function display change is 1, and a function supporting display change is selected, the IN data function setting will become the value after the display change. However, the setting method (value range) of the OUT data function setting value will not change from that before the display change.</p>												
18	7	Function (port 1) display change													
19-20	-	Function (port 1) setting value													
21	0-6	Function (port 2) No.													
21	7	Function (port 2) display change													
22-23	-	Function (port 2) setting value													
24	0-6	Function (port 3) No.													
24	7	Function (port 3) display change													
25-26	-	Function (port 3) setting value													
27	0-6	Function (port 4) No.													
27	7	Function (port 4) display change													
28-29	-	Function (port 4) setting value													

Appendix 1: Error Codes Which Cannot be Canceled by Communication

Error Code	Description
30-59	System error
100	Control power error
900-912	System error

(2) IN Data Details

offset	bit	Function	Description
0	0	Welding starting	Becomes 1 when the welding start signal is being recognized.
0	1	Inching	Becomes 1 when inching is actually underway.
0	2	Retract	Becomes 1 when retracting is actually underway.
0	3	Shield gas purge	Becomes 1 when gas is actually purging (including during welding).
0	4	Welding detected *TA (for TIG) / Pilot starting *F (for Plasma)	Becomes 1 when welding detection is actually operating (for TIG). When this bit is "1", "Welding detection result" value in Offset 1/Bit 4 is valid. / Becomes 1 when pilot start signal is detected (for Plasma).
0	5	Plasma gas discharging *F (for Plasma) / Inner gas discharging *PJ (for PJ-TIG)	Becomes 1 when plasma gas is actually discharging (including welding). (for Plasma) / Becomes 1 when inner gas is actually discharging (including welding). (for PJ-TIG)
0	6	Gas purging *F *PJ	Becomes 1 when gas is actually purging.
0	7	Watchdog	The OUT data watchdog signal is repeated back.
1	0	WCR	Becomes 1 when welding current output is detected.
1	1	READY	Becomes 1 when the welding power source is in an operable state.
1	2	Inverter output	Becomes 1 when there is output (voltage for welding is being applied between the output terminals) from the inverter of the main circuit.
1	3	Keyhole detected	Becomes 1 when keyhole is detected.
1	4	Welding detection result *TA (for TIG) / Pilot completed *F (for Plasma)	Becomes 1 when a weld (a short) is detected during welding detection (for TIG). / Becomes 1 when pilot has completed (for Plasma).
1	5	Draining *F	Becomes 1 when drainage is actually performed.
1	6	Warning	Becomes 1 when a warning is being output. A warning does not stop the welding power source unlike an error.
1	7	Error	Becomes 1 when an error is being output. The operation of the welding machine will stop.
2	-	Welding condition memory no.	The value set in the OUT data is set as it is at that time.
3	0	Welding condition memory load	An instruction to load welding condition memory is given using OUT data, and then 1 is set if it is functioning normally.
3	1	Welding condition memory write	An instruction to write welding condition memory is given using OUT data, and then 1 is set if it is functioning normally.
3	7	Setting change permission	The value set in the OUT data is set as it is at that time.
4	2-4	Welding method	The currently enabled welding mode is set.
4	5-7	AC waveform *A	
5	0	Pulse	
5	1	Touch start *TA	
	2-4	Feed mode	
6	-	Pilot current *F	
7	-	Cleaning width *A	

offset	bit	Function	Description														
5	5-7	Maximum current *F	<p>The maximum current is set according to the torch being used. The relations between the set value and the maximum current are as follows.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Maximum current</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>15A</td> </tr> <tr> <td>1</td> <td>70A</td> </tr> <tr> <td>2</td> <td>100A</td> </tr> <tr> <td>3</td> <td>150A</td> </tr> <tr> <td>4</td> <td>200A</td> </tr> <tr> <td>5</td> <td>300A</td> </tr> </tbody> </table>	Value	Maximum current	0	15A	1	70A	2	100A	3	150A	4	200A	5	300A
Value	Maximum current																
0	15A																
1	70A																
2	100A																
3	150A																
4	200A																
5	300A																
8	7	Measured value being displayed	During welding, inching, and retracting, offsets 9-15 become the display states of measured values, and this bit is set as 1.														
9-10	-	Welding current	When the measured value being displayed for offset 8/bit 7 is 0, the currently enabled setting is set. When the measured value being displayed for offset 8/bit 7 is 1, the measured value is set. However, 0 is always set to welding current and peak current when inching and retract.														
11-12	-	Wire feed speed															
13-14	-	Peak current, Welding voltage (during welding)															
16-17	-	Pulse frequency	The currently enabled setting is set.														
18	0-6	Function (port 1) No.	The currently enabled setting is set.														
18	7	Function (port 1) display change															
19-20	-	Function (port 1) setting value															
21	0-6	Function (port 2) No.															
21	7	Function (port 2) display change															
22-23	-	Function (port 2) setting value															
24	0-6	Function (port 3) No.															
24	7	Function (port 3) display change															
25-26	-	Function (port 3) setting value															
27	0-6	Function (port 4) No.															
27	7	Function (port 4) display change															
28-29	-	Function (port 4) setting value															
30-31	-	Error code		An error code is set while an error or warning is occurring. The error codes are shown in Appendix 2.													

Appendix 2: Error Codes

Error Code	Description
0	No error, or "Operation stop/error cancel" is in effect.
1-999	These values correspond to the error codes "E-****" listed in the Owner's Manual.
1001	Watchdog error
1002	Reception error from the fieldbus communication unit to the welding power source control section
1003	Warning of reception error from the fieldbus communication unit to the welding power source control section (Warning is outputted when the reception error is reset immediately after the error has occurred.)
1004	Sending error from the welding power source control section to the fieldbus communication unit
1101	Welding mode warning (The specified welding mode does not exist.)
1102	Welding condition memory number warning (Either a number that is out of range has been specified, or a number of a welding condition that has not been saved is trying to be loaded.)
1103	Welding mode switching warning during welding (Issued when not permitted welding mode is specified during welding. The warning is automatically reset after welding is complete.)
1111	Warning issued when any one of welding start, inching, retraction, gas discharge, or welding detection is already set ON when watchdog is activated or error is reset (The warning is reset when all the items are set OFF.)

4.5 Restrictions of Functions

When Fieldbus communication is set valid, there are following restrictions in the functions of the welding power source.

- (i) The setting of Function No.4 "Auto/Semi-auto mode" is fixed to 2 (Automatic machine 2).
- (ii) The functions of the initial setting, the crater (Refer to "6.6.3 Setting of crater" in the instruction manual), and the arc spot (Refer to "6.6.4 Setting of arc spot" in the instruction manual) are disabled. Accordingly, the following functions are disabled.
 - Current adjustment by torch switch operation
 - Special crater repetition
- (iii) The welding result management function (Refer to "7.2 welding result management function" in the instruction manual) is disabled.
- (iv) STICK welding is disabled.

4.6 Functions

The following limits and extensions are available for the setting of functions for Fieldbus communication.

- (i) The setting value of function no. 4 "Auto/Semi-auto mode" is fixed to 2 (Automatic machine 2).
 (ii) No setting can be made with the following functions since they are disabled.

(For WB-T500P / WB-A350P / WB-A500P)

F2: Sequence change at arc spotting

F3: Ending procedure at repetition

F6: Electric shock prevention

F11: Current increase and decrease by single-click

F12: Current increase and decrease by double-click

F13: Operation change of current adjustment in the pulse mode

(For WB-F300P)

F2: Sequence change at arc spotting

* Special crater sequence functions (F45, F46, F47) can be set as intended. When the special crater sequence (F45) is enabled, the initial condition is selected. If the initial condition is not required, set the initial time (F46) to 0 seconds.

- (iii) Function numbers 100 and after are allocated to the functions shown on the table below.

No.	Function Name	Setting Range	Default Value	Description
100	Repeater	—	—	The value set in the OUT data is set as it is at that time to the IN data.
101	Water-cooled torch *TA	OFF/ON	OFF	When set to ON, the cooling water cycle of the water-cooled torch is monitored at the welding machine. When cooling water is not flowing, a water pressure error E-500 is output.
102	Pre-flow time	0-990*TA /0-200*F	3	Sets the amount of time to discharge gas before welding starts. The unit of the setting is [0.1 s].
103	Post-flow time	0-990*TA /0-600*F	70*TA /4*F	Sets the amount of time to discharge gas after welding ends. The unit of the setting is [0.1 s].
105	Measured value display filter	0/1/2	0	Sets the display filter for measured values for the display of IN data measured values. 0: Averaged value of 1280 ms 1: Averaged value of 160 ms 2: No display filter (averaged value of approx. 20 ms)
106	AC frequency *A	300-5000	700	Sets the AC frequency. The unit of the setting is [0.1 Hz].
107	AC-DC change-over frequency *A	1-500	10	Sets the AC-DC change-over frequency. The unit of the setting is [0.1 Hz].

No.	Function Name	Setting Range	Default Value	Description
110	Plasma gas flow rate *F / Inner gas flow rate *PJ	10-500 *F / 2-200 *PJ	30 *F / 50 *PJ	Sets the plasma gas flow rate. The unit of the setting is [0.01 L/min]. (for Plasma) Sets the inner gas flow rate. The unit of the setting is [0.01 L/min]. (for PJ-TIG)
111	Shield gas flow rate *F	5-250	100	Sets the shield gas flow rate. The unit of the setting is [0.1 L/min].
112	Feed start delay time	0-50	2	Sets the delay time to start wire feed. The unit of the setting is [0.1 s].
113	Base feed speed	25-500	25	Sets the base feed speed. The unit of the setting is [cm/min].
114	Feed time (for intermittent feed)	1-50	2	Sets the feed time (for intermittent feed). The unit of the setting is [0.1 s].
115	Stop time (for intermittent feed)	1-50	2	Sets the stop time (for intermittent feed) The unit of the setting is [0.1 s].
116	Initial current	10-5000*T /10-3800*A350 /10-5500*A500 /10-3000*F	1000*T /1500*A /100*F	Sets the current in the initial condition. The setting unit is [0.1 A]. This setting is valid only when the special crater sequence function (F45) is ON.
117	Crater current	10-5000*T /10-3800*A350 /10-5500*A500 /10-3000*F	1000*T /1500*A /100*F	Sets the current in the crater condition. The setting unit is [0.1 A]. This setting is valid only when the special crater sequence function (F45) is ON.
118	Upslope time	0-100*TA /0-10000*F	10*T /0*F	Sets the upslope time. The setting unit is [0.1 s]*TA, [1 ms]*F. This setting is valid only when the special crater sequence function (F45) is ON.
119	Downslope time	0-100*TA /0-10000*F	10*T /0*F	Sets the downslope time. The setting unit is [0.1 s]*TA, [1 ms]*F. This setting is valid only when the special crater sequence function (F45) is ON.
121	Acquire welding power no.	—	—	The software information of the welding power source can be acquired through IN data. The OUT data setting value becomes disabled. The welding power number and software number are set using values other than alphabetic characters. e.g.1: For "P30174", "30174" is set. e.g.2: For "K7360", "7360" is set.
122	Acquire software no.	—	—	
123	Acquire major version	—	—	
124	Acquire minor version 1	—	—	
125	Acquire minor version 2	—	—	
126	Acquire extended version	—	—	

Revision history

Change mark	Date	Changes
First edition	Sep. 29.2015	New creation
Second edition	Jul. 14.2017	Addition of the contents for IFR-800DN(DeviceNet type)
Third edition	Jan. 17.2018	Addition of the contents for IFR-800PN(PROFINET type)
Fourth edition	May.25.2018	Addition of the contents for WB-A350P / WB-A500P
Fifth edition	Sep. 6. 2019	Addition of the contents for Special crater sequence functions.
6th edition	Apr.14.2020	Addition of the section 4.2 OUT data simplified table and section 4.3 OUT data setting example.
7th edition	Feb. 1.2023	Addition of the contents for PJ-TIG.

END