Welbee Fieldbus Connection Tool

Function Specification

For WB-P350 / WB-P400 / WB-P500L /
WB-M350L / WB-M400L / WB-M350 / WB-M400 / WB-M500

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.

- Pulse CO2/MAG/MIG welding power source: WB-P350 / WB-P400 / WB-P500L
- CO2/MAG welding power source: WB-M350L / WB-M400L / WB-M350 / WB-M400 / WB-M500

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	IFR-800PB

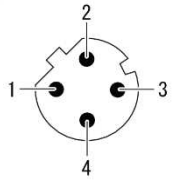
3. Specifications of Network communication

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

<table>
<tr><td>Communication standard</td><td>Ethernet/IP</td></tr>
<tr><td>Bandwidth</td><td>10/100 Mbps</td></tr>
<tr><td>Connector</td><td>IEC 61076-2-101, M12, 4-pin, D-coded, Female
 

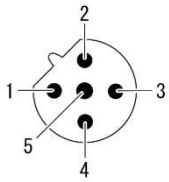
<table>
<tr><th>Pin</th><th>Signal</th></tr>
<tr><td>1</td><td>+TX</td></tr>
<tr><td>2</td><td>+RX</td></tr>
<tr><td>3</td><td>-TX</td></tr>
<tr><td>4</td><td>-RX</td></tr>
<tr><td>Housing</td><td>Shield</td></tr>
</table></td></tr>
<tr><td>IP address</td><td>Default setting: 192.168.0.2
To change the 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).</td></tr>
<tr><td>Connection</td><td>I/O connection only supported, operates as target</td></tr>
</table>

(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 
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

Pin	Signal
1	-
2	A Line (Green)
3	-
4	B Line (Red)
5	-
Housing	Shield

(2) I/O Connection Specifications

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

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.

4. Application Specifications

This describes the functions allocated the sending and receiving of I/O data using Fieldbus communication.

The following is a description of the OUT data sent from external devices (master side) to the welding machine (slave side), and the IN data sent from the welding machine (slave side) to external devices (master side).

4.1 I/O Data List

(1) OUT Data List

Byte offset	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
0	Watchdog	-	-	Welding detection	Gas purge	Retract	Inching	Welding start
1	Operation stop/reset error	-	-	-	-	-	-	-
2	Welding condition memory no. (signed 8-bit integer)							
3	Setting change permission	-	-	-	-	-	Condition memory write	Condition memory load
4	Gas (unsigned 3-bit integer)			Welding method (unsigned 3-bit integer)			Travel Speed (unsigned 2-bit integer)	
5	Penetration control	Wire diameter (unsigned 3-bit integer)		Material (unsigned 4-bit integer)				
6	Arc characteristics (signed 8-bit integer)							
7	EN ratio (signed 8-bit integer)							
8	-	-	-	-	-	Inching speed setting	Wire feed speed setting	Voltage synergy setting
9	Welding current (signed 16-bit integer)							
10								
11	Wire feed speed (signed 16-bit integer)							
12								
13	Welding voltage (signed 16-bit integer)							
14								
15	Welding voltage synergy fine adjustment (signed 8-bit integer)							
16	Wave 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								
22	Display change	Function (port 3) No. (unsigned 7-bit integer)						
25	Function (port 3) setting value (signed 16-bit integer)							
26								
23	Display change	Function (port 4) No. (unsigned 7-bit integer)						
28	Function (port 4) setting value (signed 16-bit integer)							
29								
30	-	-	-	-	-	-	-	-
31	-	-	-	-	-	-	-	-

(2) IN Data List

Byte offset	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
0	Watchdog	0	0	Welding detected	Gas purge	Retract	Inching	Welding starting
1	Error	Warning	0	Welding detection result	0	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	Gas (unsigned 3-bit integer)			Welding method (unsigned 3-bit integer)			Travel Speed (unsigned 2-bit integer)	
5	Penetration control	Wire diameter (unsigned 3-bit integer)			Material (unsigned 4-bit integer)			
6	Arc characteristics (signed 8-bit integer)							
7	EN ratio (signed 8-bit integer)							
8	Measured value being displayed	0	0	0	0	Inching speed setting	Wire feed speed setting	Voltage synergy setting
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: Welding voltage setting value / During welding: Welding voltage measured value (signed 16-bit integer)							
14								
15	During standby: Welding voltage synergy fine adjustment / During welding: No display (signed 8-bit integer)							
16	Wave 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								
22	Display change	Function (port 3) No. (unsigned 7-bit integer)						
25	Function (port 3) setting value (signed 16-bit integer)							
26								
23	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 1234h 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	1	0	0	1	0	0	0	1	1	0	1	0	0
1h				2h				3h				4h			

(ii) Handling of negative numbers

Negative numbers are handled using two's-complement notation. For example, using "signed 8-bit integers", -1 is FFh, and -128 is 80h.

4.2 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, when both inching and retracting are 1, neither will be performed. Inching and retracting do not work if welding starting is operating ahead.
0	2	Retract	
0	3	Gas purge	Operates as 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	The welding detection function using auxiliary power becomes ON when this value is set to 1. Does not work during welding startup. Also, welding starting is given priority over welding detection. Normally, upon completion of welding, the stuck wire removal function operates (refer to the Owner's Manual, 6.7.2.2 "F4: Auto/Semi-auto mode", footnote 1), so this function is not used.
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	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	Setting the welding condition memory load to 1 will load the welding condition of the number set to the welding condition memory number. 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. When both welding condition memory load and welding condition memory write are set to 1, both operations are disabled.
3	1	Welding condition memory write	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. When both welding condition memory load and welding condition memory write are set to 1, both operations are disabled.
3	7	Setting change permission	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. 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.
4-5	-	Welding mode	Sets the welding mode (refer to the Owner's Manual, 6.6.1 "Welding mode setting"). If a welding mode combination is set that does not exist, a warning is output, and the welding mode remains the same as it was before the setting was made. However, when an automatic machine is selected for an application even though a welding mode without an automatic machine combination is selected, a warning is not output and the application will be corrected to semi-auto. Similarly, when penetration control is ON even though a welding mode without penetration control combination is selected, a warning is not output and penetration control will be corrected to be OFF. The warning will be canceled when a correct combination for the welding mode is set. * Selectable combination differs according to the connected welding power source.
4	0-1	TRAVEL SPEED	Selects an application. The setting values and selected applications are shown in Appendix 2. * During welding, the setting cannot be changed.

offset	bit	Function	Description
4	2-4	WELDING METHOD	Selects a welding method. The setting values and selected welding methods are shown in Appendix 3. * During welding, the welding method setting cannot be changed between low spatter and the other methods.
4	5-7	GAS	Selects the gas. The setting values and selected gases are shown in Appendix 4. * During welding, the setting cannot be changed.
5	0-3	WIRE MATERIAL	Selects the material. The setting values and selected materials are shown in Appendix 5. * During welding, the setting cannot be changed.
5	4-6	WIRE DIAMETER	Selects the wire diameter. The setting values and selected wire diameters are shown in Appendix 6. * During welding, the setting cannot be changed.
5	7	Penetration control	When 1, penetration control is set to ON.
6	-	Arc characteristics	Sets the arc characteristics (refer to the Owner's Manual, 6.6.6 "Arc characteristics adjustment").
7	-	EN ratio	Not used.
8	0	Voltage synergy setting	When 1, the voltage setting is set to SYNERGIC mode (refer to the Owner's Manual, 6.6.5 "Welding voltage adjustment"), the voltage settings of offsets 13 and 14 are disabled, and offset 15 for welding voltage synergic fine adjustment becomes enabled.
8	1	Wire feed speed setting	When 0, offsets 9 and 10 for welding current become enabled, and when 1, offsets 11 and 12 for wire feed speed become enabled. (Refer to the Owner's Manual, 6.7.2.19, "F24: Wire feeding speed setting".)
8	2	Inching speed setting	This setting for this bit is enabled only when the wire feed speed setting of offset 8/bit 1 is 0 (welding current setting). When this bit is 1, wire is fed at the wire feed speed setting of offset 11 and 12 only during inching and retracting. When this bit is 0, the wire feed speed is set in reference to the welding current setting. When the wire feed speed setting of offset 8/bit 1 is 1, (wire feed speed setting), regardless of this bit's setting, inching and retracting are performed at the wire feed speed settings of offsets 11 and 12. The above information has been compiled in appendix 7.
9-10	-	Welding current	Sets the welding current. The unit of the setting is [A]. To apply this setting value, refer to the setting of the wire feed speed setting of offset 8/bit 1, and the inching speed setting of offset 8/bit 2.
11-12	-	Wire feed speed	Sets the wire feed speed. The unit of the setting is [0.1 m/min] or [inch/min] (follows the display of the welding power source). To apply this setting value, refer to the setting of the wire feed speed setting of offset 8/bit 1, and the inching speed setting of offset 8/bit 2.

offset	bit	Function	Description
13-14	-	Welding voltage	Sets the welding voltage. The unit of the setting is [0.1 V]. To apply this setting value, refer to the setting of the voltage synergy setting of offset 8/bit 0.
15	-	Welding voltage synergy fine adjustment	Sets the welding voltage synergy mode (refer to the Owner's Manual, 6.6.5 "Welding voltage adjustment"). To apply this setting value, refer to the setting of the voltage synergy setting of offset 8/bit 0.
16-17	-	Wave frequency	Sets the wave frequency (refer to the Owner's Manual, 6.6.8 "Adjustment of wave frequency"). The unit of the setting is [0.1 Hz]. * Only WB-P350/P400/P500L is used.
18	0-6	Function (port 1) No.	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". 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. 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. Functions 60 through 65 support display change (refer to the Owner's Manual, "Fine adjustment value display/Absolute value display in unit pulse condition" in 6.7.2.40 "F60: Fine adjustment of pulse peak current").
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

Appendix 2: TRAVEL SPEED Setting

Setting	TRAVEL SPEED
0	STANDARD
1	HIGH

*Selectable item differs according to the connected welding power source.

Appendix 3: WELDING METHOD Setting

Setting	WELDING METHOD
0	DC PULSE
1	DC
2	DC LOW SPATTER
3	DC WAVE PULSE

*Selectable item differs according to the connected welding power source.
*During Fieldbus communication, the TIG welding and the shielded metal arc welding are disabled (with adaptable models).
*"DC" is fixed on WB- M350/M400/M500 regardless of the setting.

Appendix 4: GAS Setting

Setting	GAS
0	CO_2
1	MAG(20%CO_2)
2	MIG(2%O_2)
3	MIG(100%Ar)
4	MAG(10%CO_2)
5	MIG(2.5%CO_2)

*Selectable item differs according to the connected welding power source.

Appendix 5: WIRE MATERIAL Setting

Setting	WIRE MATERIAL
0	MILD STEEL
1	MILD STEEL CORED
2	STANLESS STEEL
3	STANLESS FERRITE
4	STANLESS CORED
5	Al/Mg / HARD ALUMINUM
6	Al/PURE / SOFT ALUMINUM
7	Brazing CuSi
8	Brazing CuAl
9	INCONEL
10	TITANIUM

*Selectable item differs according to the connected welding power source.

Appendix 6: WIRE DIAMETER Settings

Setting	WIRE DIAMETER [mm]	WIRE DIAMETER [inch]
0	0.8	.030
1	0.9	.035
2	1.0	.040
3	1.2	.045 - 3/64
4	1.4	.052
5	1.6	1/16

*Selectable item differs according to the connected welding power source.

Appendix 7: Inching Speed Settings

offset 8: bit 1 (Wire feed speed setting)	offset 8: bit 2 (Inching speed setting)	Welding Output	Inching speed setting
0	0	offsets 9-10 enabled (Welding current setting)	offsets 9-10 enabled (Same as speed when welding)
	1		offsets 11-12 enabled
1	0	offsets 11-12 enabled (Wire feed speed setting)	offsets 11-12 enabled
	1		

(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	Gas purge	Becomes 1 when gas is actually purging (including during welding).
0	4	Welding detected	Becomes 1 when welding detection is actually operating. When this bit is "1", “Welding detection result” value in Offset 1/Bit 4 is valid.
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	4	Welding detection result	Becomes 1 when a weld (a short) is detected during welding detection.
1	6	Warning	Becomes 1 when a warning is being output. A warning is different from an error in that the operation of the welding machine is not stopped.
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	0-1	Travel Speed	The currently enabled welding mode is set.
4	2-4	Welding method	
4	5-7	Gas	
5	0-3	Material	
5	4-6	Wire diameter	
5	7	Penetration control	
6	-	Arc characteristics	The currently enabled setting is set.
7	-	EN ratio	Not used.
8	0	Voltage synergy setting	The currently enabled setting is set.

offset	bit	Function	Description
8	1	Wire feed speed setting	
8	2	Inching speed setting	
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, at this time the welding voltage synergy fine adjustment will always be set to 0.
11-12	-	Wire feed speed	
13-14	-	Welding voltage	
15	-	Welding voltage synergy fine adjustment	
16-17	-	Wave 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 8.

Appendix 8: 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.)

4.3 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.
  F6: Upslope time
  F7: Downslope time
  F45: Special crater sequence
  F46: Special crater sequence initial time
  F47: Special crater sequence crater time
  F48: Current adjustment by torch switch operation
  F49: Electric current increase/decrease value by a single-clicking
  F50: Electric current increase/decrease value by double-clicking
  F51: Special crater repetition
(iii) The welding result management function (Refer to "7.2 welding result management function" in the instruction manual) is disabled.
(iv) The shielded metal arc welding mode and the TIG welding mode are disabled with the welding power source having such functions.

4.4 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) The following functions are disabled.
- F6: Upslope time
- F7: Downslope time
- F45: Special crater sequence
- F46: Special crater sequence, initial standard time setting
- F47: Special crater sequence, crater standard time setting
- F48: Adjusting current with torch switch
- F49: Current increase and decrease by single-clicking
- F50: Current increase and decrease by double-clicking
- F51: Special crater repeat

(iii) The setting of function no. 24 "Wire feeding speed setting" is performed by offset 8/bit 1 of the OUT data, and so cannot be set from a function.
(iv) Function numbers over 100 are allocated to the functions shown in 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	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	0-100	1	Sets the amount of time to discharge gas before welding starts. The unit of the setting is [0.1 s].
103	Post-flow time	0-100	4	Sets the amount of time to discharge gas after welding ends. The unit of the setting is [0.1 s].
104	Stuck wire removal voltage	OFF/ON	ON	When set to OFF, the welding cancel function (refer to the Owner's Manual, 6.7.2.2 "F4: Auto/Semi-auto mode", footnote 1) is disabled.
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)

No.	Function Name	Setting Range	Default Value	Description
106	Acquire wire feed load	—	—	The measured value for the wire feed load can be acquired through IN data. The value is expressed as a percentage [%] of the rated load. The OUT data setting value becomes disabled.
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. Ex. 1: For "P30125", "30125" is set. Ex. 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	—	—	

4.5 Control Timing

(1) Pre-flow/Post-flow

The timing for welding start and pre-flow/post-flow normally follows the timing described in "6.6.3.1 Crater OFF" in the Owner's Manual (read with "welding start" in place of "Torch switch").

However, when gas purge is set to ON before welding startup, and then welding start is set to ON while gas purge remains ON, the pre-flow period is eliminated and voltage output occurs immediately. Conversely, regardless of whether gas purge is switched between ON/OFF after welding is completed, there is a mandatory post-flow period in which gas purge cannot be stopped.

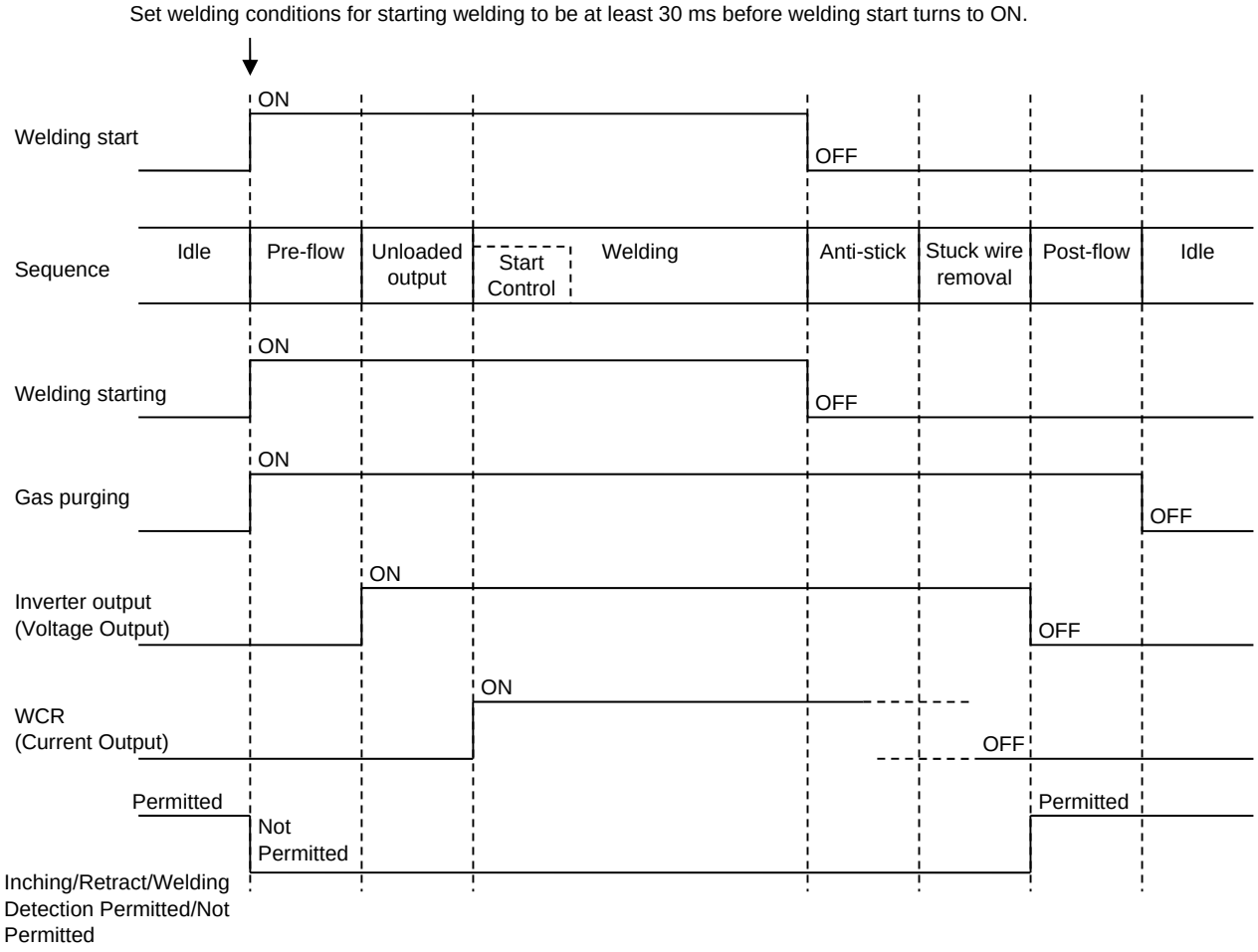
The pre-flow and post-flow times can be set to 0.

(2) Sequence at welding startup and inching/retract/welding detection

The welding sequence determined by welding start ON/OFF operations is shown in the diagram below.

Set welding conditions (welding mode, welding current, etc.) for starting welding to be at least 30 ms before welding start turns to ON. When the welding condition is changed simultaneously with welding start turns to ON, the welding condition changes of the moment of welding start may not be applied correctly.

In the period from when welding start turns ON until the inverter (voltage output) turns OFF, inching, retract, and welding detection operations are not permitted. However, when inching or retract are set to ON before welding start becomes ON, the welding start is not permitted. While welding detection operation is occurring, in cases when welding start becomes ON, the welding start is prioritized and the welding detection operation is stopped.



Revision history

Change mark	Date	Changes
First edition	Apr.2. 2015	New creation

END