

DX200

Instruction manual for motor gun (spot welding) application related functions

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YASKAWA ELECTRIC CORPORATION

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Spot welding functions: contents (1/2)

Letters in red are new items from DX200

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Spot welding functions: contents (2/2)

Letters in red are new items from DX200

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Spot welding window

Applicable function

- Spot Welding Application Main Menu

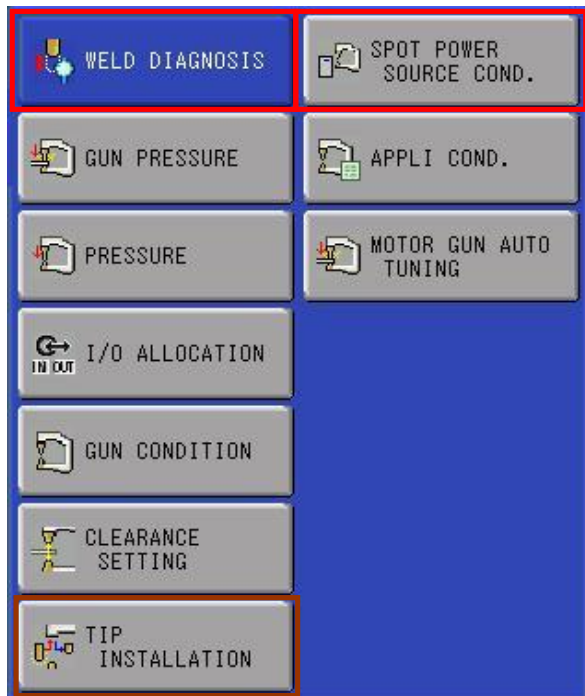
Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9. Spot Welding Application Using a Motor Gun

Functional overview

- Spot welding menu and its namings have been changed for more intuitive operations
- Each menu items have been reviewed and renewed for a better suiting menu

【DX100】



Naming changes

- WELD DIAGNOSIS
⇒ SPOT SUPERVISION
- SPOT POWER SOURCE COND.
⇒ WELDER IF

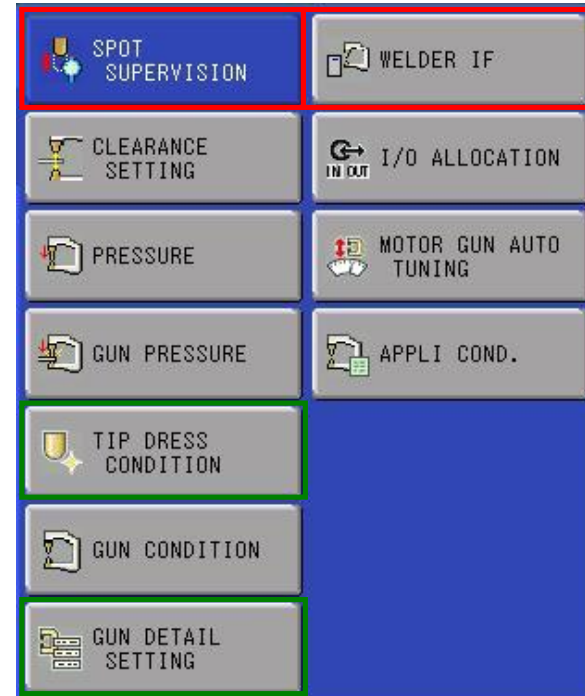
Deleted after menu integration

- TIP INSTALLATION
⇒ SPOT SUPERVISION

Additional menu

- TIP DRESS CONDITION
- GUN DETAIL SETTING

【DX200】



Auto tuning

Applicable function

- Motor gun auto tuning function

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.3.6 *Execution of Motor Gun Auto Tuning Function*

Functional overview

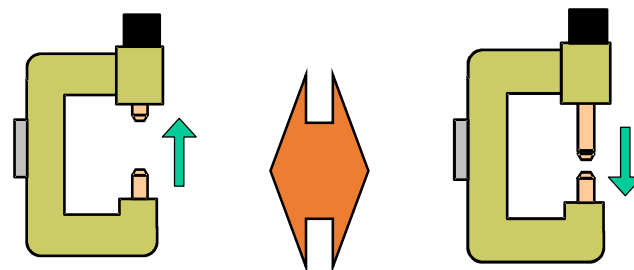
- The dynamic characteristics of the motor gun are measured (tuned) automatically
- It is possible to operate fast and steady motion needed for spot welding (* It is mandatory for DX200)

【Motor gun auto tuning window】

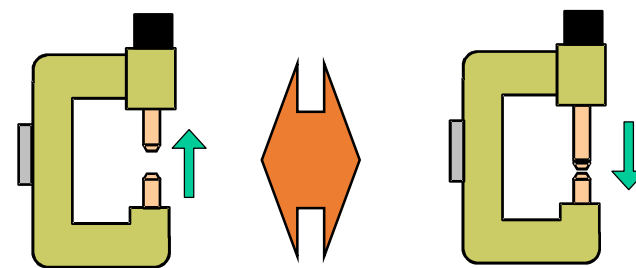
MOTOR GUN AUTO TUNING

COMMENT	
ENFORCEMENT DAY	2014/01/17 17:52
STATUS	COMPLETE

WARNING: Press 'EXECUTE' to execute the auto tuning.
If you press the start button,
the job will be executed.



【STEP1】Tuning of gun axis motion



【STEP2】Tuning of pressure motion

Motor gun setup

Applicable function

- Simplification of motor gun setup

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN:
9.4.1 Gun Condition File

Functional overview

- The gun condition data is automatically set up, by setting the gun mechanism specification in maintenance mode
- After setting maintenance, it is possible to immediately operate pressure motion

【Maintenance mode, Motor gun settings】

MECHANICAL SPEC	
S1 : GUN-1	AXIS: 1
AXIS TYPE: BALL-SCREW	
GUN TYPE	C-GUN
MOTION RANGE(+)	50.000 mm
MOTION RANGE(-)	-30.000 mm
REDUCTION RATIO(NUMER)	1.000
REDUCTION RATIO(DENOM)	1.000
BALL-SCREW PITCH	10.000 mm/r
MAX PRESSURE	2000 N

【GUN CONDITION file window】

Gun condition					
Gun number: 1					
SETTING	END				
GUN TYPE	C-GUN				
WELDER NO.	1				
TORQUE DIR.	-				
	PULSE	STROKE	TORQUE		PRESSURE
1	2048	5.0 mm	12.5 %	500	N
2	4096	10.0 mm	25.0 %	1000	N
3	20480	50.0 mm	37.5 %	1500	N
4	0	0.0 mm	50.0 %	2000	N
5	0	0.0 mm	62.5 %	2500	N

Please check using pressure gauge

Automatic setup reduces setup operation by 50%

Motor gun condition setup

Applicable function

- Gun condition file

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING
USING MOTOR GUN: 9.4.1 Gun Condition File

Functional overview

- Setup motor gun's **unique mechanical properties** into **gun condition file**
- Gun condition data is automatically setup by setting gun mechanism specification in maintenance mode. (Settings executed by calculation. Please check with measuring instrument)
- Possible to instruct with amount of stroke and pressure (N)
 - * Possible to setup 12 guns max.

【Maintenance mode window】

MECHANICAL SPEC		
S 1	: GUN-1	AXIS: 1
AXIS TYPE: BALL-SCREW		
GUN TYPE C-GUN		
MOTION RANGE(+)	50.000	mm
MOTION RANGE(-)	-30.000	mm
REDUCTION RATIO(NUMER)	1.000	
REDUCTION RATIO(DENOM)	1.000	
BALL-SCREW PITCH	10.000	mm/r
MAX PRESSURE	3000	N

- ① Setup relationship between motor pulse and gun stroke
Use the settings values for each compensation (bend, wear compensation etc.)
- ② Set up relationship between motor torque and pressure
- ③ For this type of compensation coefficient, use setup values from 1 and 2

【Gun condition file window】

GUN CONDITION				
GUN NO.: 1				
SETTING	DONE			
GUN TYPE	C-GUN			
WELDER NO.	1			
TORQUE DIR	+			
	PULSE	STROKE	TORQUE	PRESSURE
1	2048	5.0 mm	12.5 %	500 N
2	4096	10.0 mm	25.0 %	1000 N
3	20480	50.0 mm	37.5 %	1500 N
4	40960	100.0 mm	50.0 %	2000 N
5	0	0.0 mm	62.5 %	2500 N
6	0	0.0 mm	75.0 %	3000 N
7	0	0.0 mm	87.5 %	3500 N
8	0	0.0 mm	100.0 %	4000 N
9	0	0.0 mm	0.0 %	0 N
10	0	0.0 mm	0.0 %	0 N
11	0	0.0 mm	0.0 %	0 N
12	0	0.0 mm	0.0 %	0 N
MAX PRESSURE			4000	N
PRESSURE COMPENSATION			50	N
GUN ARM BEND COEF.			X	0.000 mm/1000N
			Y	0.000 mm/1000N
			Z	0.500 mm/1000N
GUN PUSHING COEF				1.000 mm/1000N
GUN INSTALLATION STATUS			ROBOT-HANDLE	

Possible to set motor torque to 0.0%

Pressure compensation function by posture

Applicable function

- Pressure compensation function by posture

Related document

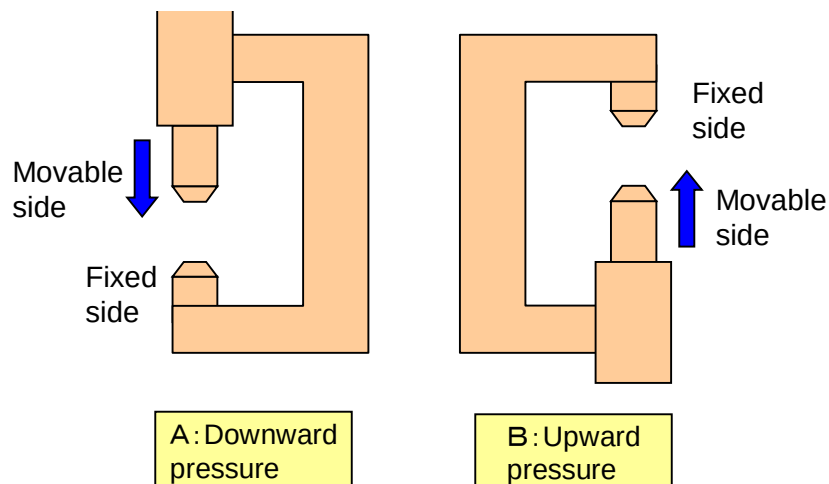
- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.14.5 Gun Pressure Compensation Function

Functional overview

- It is possible to **maintain constant pressure** as pressure command is automatically corrected when motor gun's posture changes during press with motor gun

From the effect of gravity on the moving parts, the pressure varies between **A: Applying pressure downwards (direction of gravitational force)** and **B: applying pressure upwards (direction opposite to A)**

Enter compensation value of any posture into pressure compensation table of gun condition file, in order to correct pressure and maintain constant pressure.



【Gun condition file window】

GUN CONDITION									
GUN NO.: 1									
SETTING	DONE								
GUN TYPE	C-GUN								
WELDER NO.	1								
TORQUE DIR	+								
	PULSE	STROKE		TORQUE		PRESSURE			
1	2048	5.0	mm	12.5	%	500	N		
2	4096	10.0	mm	25.0	%	1000	N		
3	20480	50.0	mm	37.5	%	1500	N		
4	40960	100.0	mm	50.0	%	2000	N		
5	0	0.0	mm	62.5	%	2500	N		
6	0	0.0	mm	75.0	%	3000	N		
7	0	0.0	mm	87.5	%	3500	N		
8	0	0.0	mm	100.0	%	4000	N		
9	0	0.0	mm	0.0	%	0	N		
10	0	0.0	mm	0.0	%	0	N		
11	0	0.0	mm	0.0	%	0	N		
12	0	0.0	mm	0.0	%	0	N		
MAX PRESSURE						4000	N		
PRESSURE COMPENSATION						50	N		
GUN ARM BEND COEF.				X	0.000	mm/1000N			
				Y	0.000	mm/1000N			
				Z	0.500	mm/1000N			
GUN PUSHING COEF						1.000	mm/1000N		
GUN INSTALLATION STATUS						ROBOT-HANDLE			

Gun arm bend compensation

Applicable function

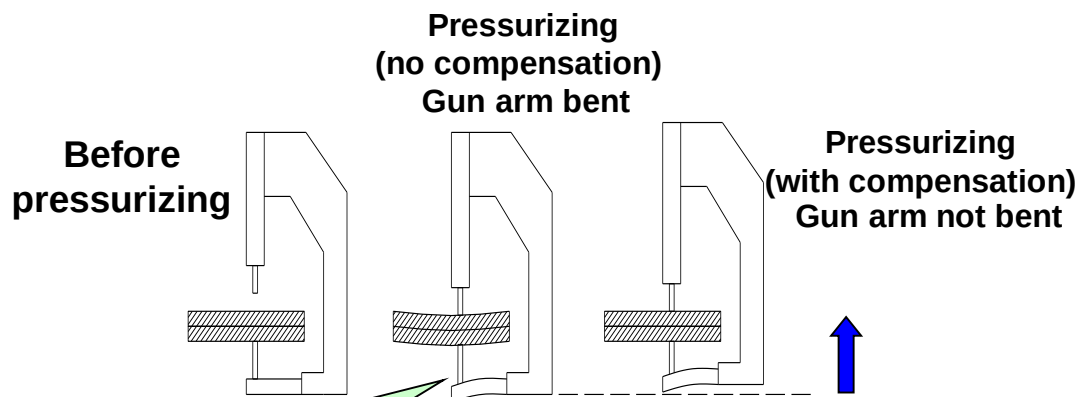
- Gun arm bend compensation

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.14.6 Compensation of Gun Arm Bend for C-Gun and X-Gun (SINGLE ARM MOVE)

Functional overview

- The gun arm bend while pressurizing can be compensated by the compensation manipulator operation, **minimizing deformation of works**.
- Equalizing mechanism will not be needed hence, the gun will be lighter and simpler.



Tool Z+ direction ($K \times F \div 1000$)mm compensation
 K (mm/1000N): gun bend compensation coefficient
 F (N): gun pressure

Enter gun arm bend compensation value (tool coordinate direction X,Y,Z) into gun condition file, in regards to 1000N pressure.

【Gun condition file window】

GUN CONDITION				
GUN NO.: 1				
SETTING	DONE			
GUN TYPE	C-GUN			
WELDER NO.	1			
TORQUE DIR	+			
	PULSE	STROKE	TORQUE	PRESSURE
1	2048	5.0 mm	12.5 %	500 N
2	4096	10.0 mm	25.0 %	1000 N
3	20480	50.0 mm	37.5 %	1500 N
4	40960	100.0 mm	50.0 %	2000 N
5	0	0.0 mm	62.5 %	2500 N
6	0	0.0 mm	75.0 %	3000 N
7	0	0.0 mm	87.5 %	3500 N
8	0	0.0 mm	100.0 %	4000 N
9	0	0.0 mm	0.0 %	0 N
10	0	0.0 mm	0.0 %	0 N
11	0	0.0 mm	0.0 %	0 N
12	0	0.0 mm	0.0 %	0 N
MAX PRESSURE			4000 N	
PRESSURE COMPENSATION			50 N	
GUN ARM BEND COEF.		X	0.000	mm/1000N
		Y	0.000	mm/1000N
		Z	0.500	mm/1000N
GUN PUSHING COEF			1.000 mm/1000N	
GUN INSTALLATION STATUS			ROBOT-HANDLE	

Welding timer signal allocation

Used Function

- Welder I/F file

Functional overview

- Set general input/output signal with welding timer, format or type of welding condition to the welder I/F
- There are 3 types of settings for welding instruction output type: "level", "pulse", and "start" signal (diagram on the right shows the activation timing when setting to "level")

* Up to 4 welding timers can be connected

WELDER I/F
WELDER NO.: 1

INPUT

WELD COMPLETE IN# 0013
WELD COMPLETE WAIT TIME 5.0 sec

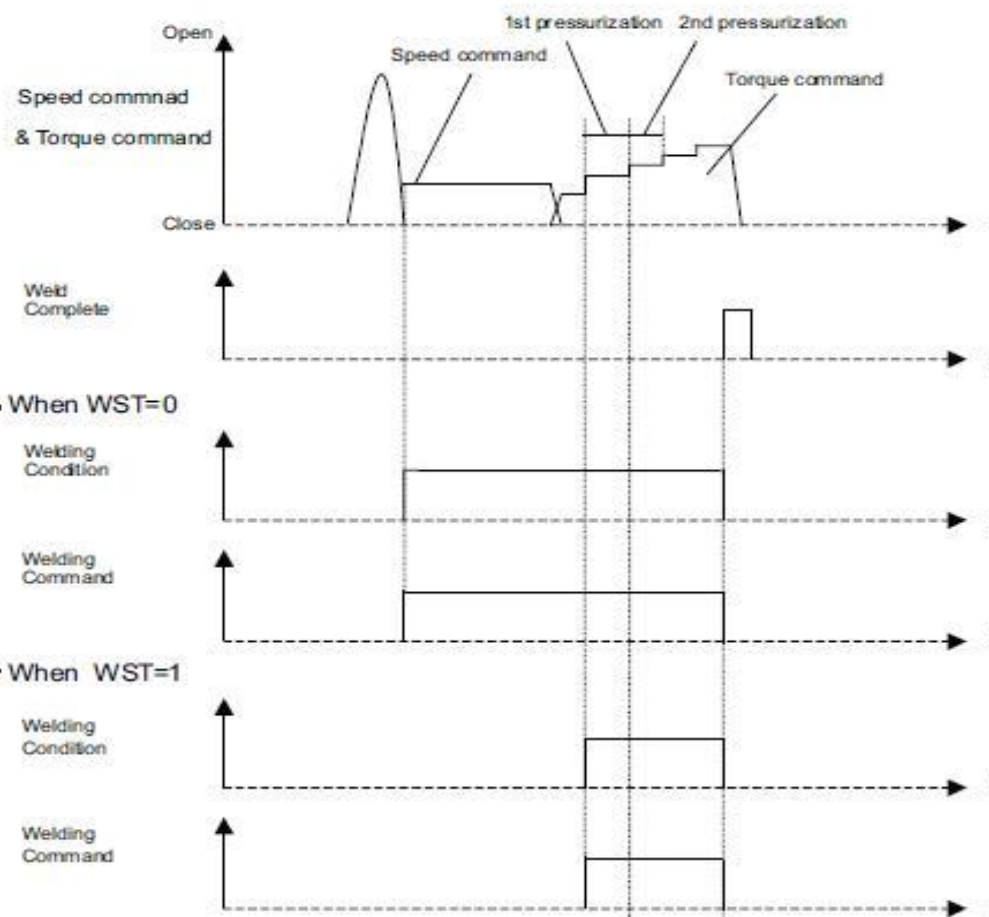
OUTPUT

WELDING ERROR RESET OUT# 0010
WELDING CONDITION OUT# 0011 → 0014
WELD COND OUTPUT FORMAT BINARY
WELD COND OUTPUT TYPE LEVEL
WELD COND OUTPUT TIME 0.50 sec
WELD COND MAX NUM 31
WELDING CONDITION PARITY OUT# ****
WELDING COMMAND OUT# ****
WELD GROUP OUTPUT OUT# **** → ****
STICK DETECT DELAY TIME 5.00 sec

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.4.2.2 Welder I/F File

* When the welding command output type is set to "LEVEL":



Allocation of I/O with auxiliary equipment

Used Function

- I/O allocation file

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.4.2.3 I/O Allocation

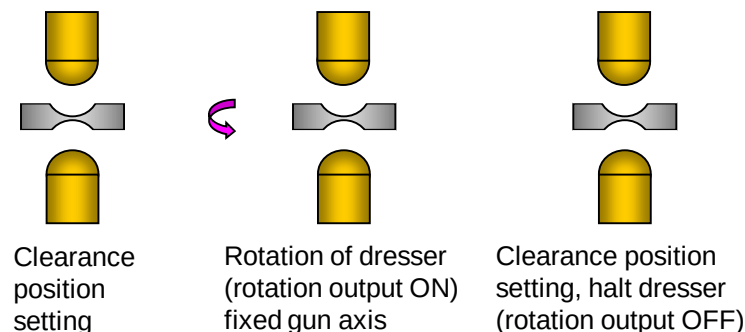
Functional overview

- Set the I/O allocation of ATC related gun change specification and dry tip dress
- By setting and inputting general input, exclusion operation becomes possible during for example, facility durability drive, exclusion of tip polishing operation etc.
- ATC related signal setting items will be displayed only during gun change function enabled.

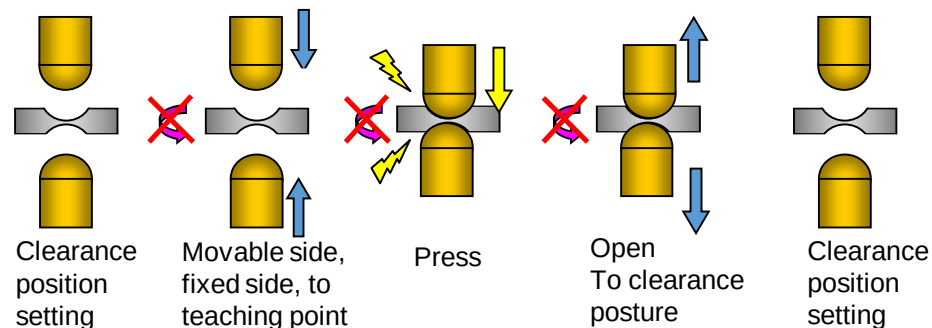
I/O ALLOCATION	
INPUT	
DRY TIP DRESS(WITHOUT PRESSING)	IN# [---]
DRY TIP DRESS(WITHOUT DRESSING)	IN# [---]
GUN CHUCK(WELDER1)	IN# [---]
GUN UNCHUCK(WELDER1)	IN# [---]
GUN ID NO. (WELDER1)	IN# [---] → [---]
OUTPUT	
GUN UNCHUCK REQUEST(WELDER1)	OUT# [---]

* Items will be added during gun change specification

【Dry Tip Dress (without pressing)】



【Dry Tip Dress (without dressing)】



Spot application (motor gun) function keys

Used Function

- Main application function key (motor gun)

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.2 Function keys

Functional overview

- Prior allocation of spot application (motor gun) functions on keys
- Standard is equipped with spot application function key



Description of main application function keys

	Displays the MANUAL PRESS window.		The SHORT OPEN POSITION SETTING window appears the first time this key is pressed. The selection No. for the short open position is replaced by pressing this key while the SHORT OPEN POSITION SETTING window is appeared.
	Displays the WORK HOME POSITION window. [FWD] + [TASK ORIGIN] With the WORK HOME POSITION window in the teach mode, press these keys to move the manipulator to the work home position.		The FULL OPEN POSITION SETTING window appears the first time the key is pressed. The selection No. for the full open position is replaced by pressing this key while the FULL OPEN POSITION SETTING window is appeared.
	Displays the SVSPOT instruction in the input buffer line in order to register spot welding operation. [INTERLOCK] + [SPOT] With the MANUAL PRESS window, press these keys to execute manual spot welding.		[INTERLOCK] + [WELD ALM RESET] A welder alarm reset signal is output to the welder while these keys are held down.
	Displays the SVGUNCL instruction in the input buffer line in order to register dry spot welding operation. [INTERLOCK] + [GUN CLOSE] With the MANUAL PRESS window, press these keys to execute manual dry spot welding.		[INTERLOCK] + [PRESSURE] With the MANUAL PRESS window or the JOB window, press these keys to execute pressurizing.
	[INTERLOCK] + [WELD ON/OFF] Turns the welding ON/OFF signal ON or OFF.		[INTERLOCK] + [RELEASE] Executes releasing.
			[INTERLOCK] + [SEARCH] Executes searching a work.

Spot welding by key operation

Used Function

- Manual welding

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.5.1 Manual Spot

Functional overview

- Spot welding can be executed with key operation without using welding instruction (SVSPOT)
- Can be used for example for adjusting welding conditions

During teach mode, execute provisional welding with key operation at specific time, when displaying manual spot window

1. Press [0/MANUAL SPOT] of [Numeric Key].



Switch window

2. Press [INTERLOCK] + [./SPOT].



【Manual condition window】

MANUAL PRESS	
GUN NO.	1
PRESS MEASUREMENT MODE	DISABLE
ROBOT FOR PRESSURE/BEND COMPENSATION	R1
MANUAL PRESS([INTERLOCK] + [8])	
TOUCH SPEED	5 %
PRESS UNIT	N(PRESSURE)
PRESSURE	1000 N
MANUAL DRY SPOT([INTERLOCK] + [2])	
MANUAL DRY SPOT MODE	FILE
PRESSURE FILE NO.	1
MANUAL SPOT([INTERLOCK] + [.])	
MANUAL SPOT MODE	FILE
GUN PRESSURE FILE NO.	1
WELDING CONDITION(WTM)	1
WELDER STARTUP TIMING(WST)	1ST
WELD GROUP OUTPUT(WGO)	0

*Manual spot operates under the conditions that are set in the MANUAL PRESS window.

Non-conducting pressure operation by key operation

Used Function

- Manual Dry Spot

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.5.2 Manual Dry Spot

Functional overview

- Press (dry spot) can be executed with key operation without using dry spot instruction (SVGUNCL)
- Can be used for example for fitting tip during tip exchange

During teach mode, execute manual press with key operation at specific time, when displaying manual spot window

- Press [0/MANUAL SPOT] of the [Numeric Key].



Switch window

- Press [INTERLOCK] + [2/GUN CLOSE].



【Manual condition window】

MANUAL PRESS	
GUN NO.	1
PRESS MEASUREMENT MODE	DISABLE
ROBOT FOR PRESSURE/BEND COMPENSATION	R1
MANUAL PRESS([INTERLOCK] + [8])	
TOUCH SPEED	5 %
PRESS UNIT	N(PRESSURE)
PRESSURE	1000 N
MANUAL DRY SPOT([INTERLOCK] + [2])	
MANUAL DRY SPOT MODE	FILE
PRESSURE FILE NO.	1
MANUAL SPOT([INTERLOCK] + [.])	
MANUAL SPOT MODE	FILE
GUN PRESSURE FILE NO.	1
WELDING CONDITION(WTM)	1
WELDER STARTUP TIMING(WST)	1ST
WELD GROUP OUTPUT(WGO)	0

* Manual dry spot operates under the conditions that are set in the MANUAL PRESS window

Register gun opening position

Used Function

- Setting full-open/short-open position

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.14.1 Motor Gun Stroke

Functional overview

- Register shortcut to specify the opening position, to facilitate registration of gun opening position teaching operation

It is possible to operate the registered opening position by doing the following:

1. Full-open

Press [INTERLOCK] + [3/FULL OPEN]



Setting window

Press 「3/FULL-OPEN」 / 「-/SHORT OPEN」 on numeric key

2. Short-open

[INTERLOCK] + [-/SHORT OPEN].



【Full-open/short-open position setting】

Up to 8 stroke positions can be registered respectively for full-open/short-open. Select current set value from the 8 stroke position

GUN NO.: 1 / 2			
SEL	POSITION	SEL	POSITION
1	50.000	5	0.000
2	100.000	6	0.000
3	150.000	7	0.000
4	0.000	8	0.000

OPEN POS SET GUN NO.: 1 / 2			
SEL	POSITION	SEL	POSITION
1	10.000	5	0.000
2	20.000	6	0.000
3	30.000	7	0.000
4	0.000	8	0.000

Teaching method when tip is not visible

Used Function

- Work search function

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.10.8 Work search function

Functional overview

- Teaching is now possible for both fixed and movable tips from non-visible location
- Both fixed and movable tips operate automatically from a distance. Moreover, they detect work's position, reducing teaching time.

Press [INTERLOCK] + [5] simultaneously on numeric key to operate.



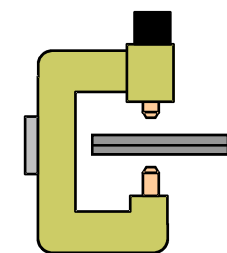
SICxG175: Threshold of the workpiece detection by the movable side tip

Specifies the threshold of workpiece detection by the movable side tip

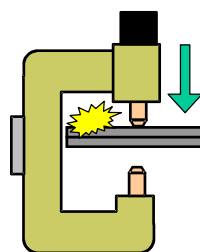
0: 10 [N]

Others: SICxG175 [N]

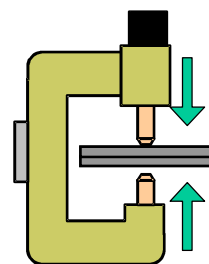
<example> When the following value is set, the detecting threshold is 20 [N].
SICxG175=20



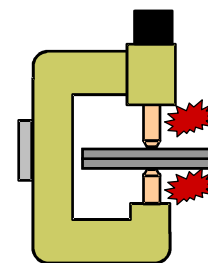
Start searching



Searching the work piece
by the movable tip



Searching the work piece
by the fixed tip.
Keeping the movable tip
touching the work piece



Complete searching

Non-conducting pressure operation

Used Function

- SVGUNCL instruction

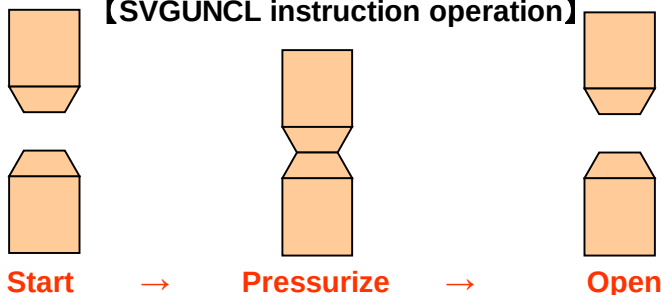
Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.8 Dry spot (Motor Gun) 9.8.3 Work transfer function using a motor gun

Functional overview

- Dry spot instruction that only executes motor gun press without being powered (welding)
- Instruction used for measuring tip wear, tip dress press, mounting operation after tip replacement etc.
- It is possible to transfer works by using the motor gun's press as gripping force

【SVGUNCL instruction operation】



SVGUNCL GUN#(1) PRESSCL#(1) * * *

① ② ③

- ① GUN#(1): Gun number
- ② PRESSCL#(1): dry spot pressure file number
- ③ TWC-A (B): specify wear detection operation
ON (OFF) : specify work transfer operation

* ② choose file by objective (check next slide)

* ③ Tag used when detecting tip wear or work transfer.

【Dry spot pressurizing file window】

PRESSURE
FILE NO.: 1 / 32

TIP DRESSER ROTATION REQUEST	OUT#	---
PRE CUT TIME	0.00	sec
END CUT TIME	0.00	sec

TOUCH SPEED 100 %
PRESS UNIT N(PRESSURE)
COMMENT

	PRESS	TIME	OUT	SIGNAL
1ST PRESS	2000	0.50	OFF	OUT# ---
2ND PRESS	2500	1.00	ON	OUT# 0001
3RD PRESS	3000	0.50	OFF	OUT# ---
4TH PRESS	3500	1.00	ON	OUT# 0002

- ① Specify output signal, precut, end-cut time during tip dressing
- ② Press can be set to 4 stages
- ③ Can output signal synchronized to Press

Non-conducting pressure operation by objective

Used Function

- SVGUNCL instruction

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.8.1 Registration of Dry Spot Instruction (SVGUNCL instruction)

Functional overview

● Same as DX100

SVGUNCL GUN#(1) **PERSSCL#(1)**

Gun signal Dry spot pressure file

● When detecting wear

SVGUNCL GUN#(1) **PRESSTWC** TWC-A

Gun number Wear detection condition Wear detection tag

SPOT SUPERVISION			
GUN NO.: 1 / 2			
CURRENT		TOLERANCE	
WELD COUNT			
WELD COUNT	0	0	OUT#
RESET COUNT			
WEAR DETECTION(M:MOVABLE SIDE F:FIXED SIDE)			
WEAR(M)	-25.0 mm	0.0 mm	OUT# ****
WEAR(F)	-25.0 mm	0.0 mm	OUT# ****
THICKNESS DETECTION			
DETECTED THICKNESS	0.0 mm		M 000
WEAR DETECT CONDITION			
TOUCH SPEED		5 %	
DETECT PRESSURE		1000 N	
WEAR RATIO(FIXED SIDE)		50 %	
WEAR COMPENSATION OFFSET(FIXED SIDE)		0.00 mm	
WEAR DETECT SENSOR DIN NO.		1	
WEAR DETECT SENSOR POLARITY		OFF->ON	

Execute wear detection condition in spot supervision

● Direct input

SVGUNCL GUN#(1) **WP=2500**

Gun number Direct command (2500N)

● During tip dressing (correct wear, bend (incl.))

SVGUNCL GUN#(1) **DRS#(1)**

Gun number Tip dress condition file

TIP DRESS CONDITION			
FILE NO.: 1 / 16			
DRESSER			
PRESS CONDITION			
TOUCH SPEED		5 %	
1ST PRESS	1000 N	1.00 sec	
2ND PRESS	0 N	0.00 sec	
CLEARANCE CONDITION			
DISTANCE TO UPPER TIP		20.0 mm	
DISTANCE TO LOWER TIP		20.0 mm	
THICKNESS		0.0 mm	
ROTATION WAIT TIME		0.00 sec	
IO CONDITION			
ROTATION REQUEST		OUT# ----	

Execute pressure condition in tip dress condition

Non-conducting pressure operation by external signal

Used Function

- Forced pressure function

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.14.4 Signal Dry Spot

Functional overview

- Non-conducting pressurizing operation is possible by external signal input when checking misalignment after tip fitting (after tip replacement), gun maintenance etc.

For dry spot signal (file)

After the signal is input, pressurizing is started. Pressure is applied according to the settings in the dry spot pressure file specified. The gun stops applying pressure after a specified time period.

For dry spot signal (continue)

After signal external signal input, start pressurizing, release gun by changing external signal input to OFF (pressure is applied while being ON)

- During fitting of tip while replacing tip
- During misalignment check of motor gun etc.



External signal input

Execute non-conducting pressure operation

【Gun detail setting window】

Set general input number and file number to execute dry spot signal on gun detail setting window.

GUN DETAIL SETTING	
GUN NO.: 1 / 2	
STROKE MOTION SPEED	100.00 %
TOUCH MOTION CONDITION	
TOUCH SPEED	5 %
FINAL TOUCH SPEED START POSITION	3 mm
FINAL TOUCH SPEED	5 %
TOUCH PRESSURE	600 N
ALLOWABLE TOUCH RANGE(MOVABLE SIDE)	0.0 mm
ALLOWABLE TOUCH RANGE(FIXED SIDE)	0.0 mm
DRY SPOT	
PRESSURE FILE NO.	1
DRY SPOT SIGNAL(FILE)	IN# ****
DRY SPOT PRESSURE(CONTINUE)	1000 N
DRY SPOT SIGNAL(CONTINUE)	IN# ****
TOUCH TEACHING	
THICKNESS	0.0 mm
GUN STROKE	0.0 mm
TCP ADJUSTMENT	0.0 mm

Welding execution instruction

Used Function

- SVSPOT instruction

Related document

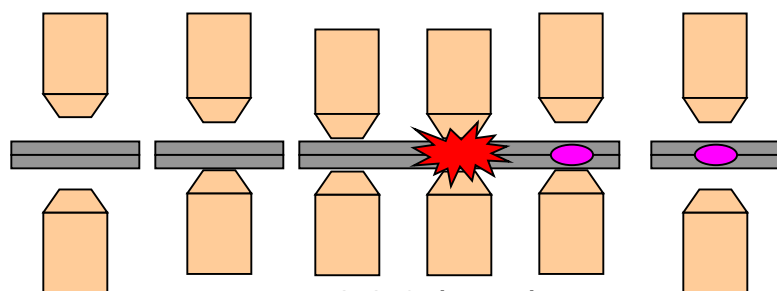
- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.7 Welding instruction (SVSPOT instruction)

Functional overview

- Spot welding operation instruction for auto welding (play operation)
- Settings management of pressure executed by direct input or pressure file

【JOB example】

- MOVJ
- MOVJ ← Execute spot welding here
SVSPOT GUN#(1) PRESS#(1) WTM=1 WST=1
- MOVJ



SVSPOT instruction

1 2 (Pressure → welding → release) 3

SVSPOT GUN#(1) PRESS#(1) WTM=1 WST=1

- ① GUN#(1) : Gun number
② PRESS#(1) : Pressurizing file number
③ WTM=1 : Welding condition number
④ WST=1 : Welder start timing

* ② is direct input of pressure WP= , shortcut can also be set (pressurize with WTM file number)

【Gun pressurizing file window】

GUN PRESSURE					
CONDITION NO.:		1/255		GROUP NO.: 1/1	
SETTING	DONE				
TOUCH SPEED	100%				
COMMENT					
	PRESS		END CONDITION		
1ST PRESS	2000	N	PRESS TIME	0.50	sec
2ND PRESS	2500	N	PRESS TIME	0.50	sec
3RD PRESS	3000	N	PRESS TIME	0.50	sec
4TH PRESS	3500	N	END WAIT		

- ① Press can be set to 4 stages
② Welding timer will send welding completion signal

Contact point teaching method (1)

Used Function

- Touch teaching function

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.14.3 Touch teaching function

Functional overview

Even if the fixed tip position cannot be visually confirmed when teaching, it is possible to register the position where the fixed tip touches the work piece by moving the movable tip to touch the work piece.

Bring in contact movable side electrode, and press 「SHIFT」+「ENTER」 to register position.

* Necessary to set work piece thickness on gun detail setting window before.

GUN DETAIL SETTING	
GUN NO.: 1 / 2	
STROKE MOTION SPEED	100.00 %
TOUCH MOTION CONDITION	
TOUCH SPEED	5 %
FINAL TOUCH SPEED START POSITION	3 mm
FINAL TOUCH SPEED	5 %
TOUCH PRESSURE	600 N
ALLOWABLE TOUCH RANGE(MOVABLE SIDE)	0.0 mm
ALLOWABLE TOUCH RANGE(FIXED SIDE)	0.0 mm
DRY SPOT	
PRESSURE FILE NO.	1
DRY SPOT SIGNAL(FILE)	IN# ****
DRY SPOT PRESSURE(CONTINUE)	1000 N
DRY SPOT SIGNAL(CONTINUE)	IN# ****
TOUCH TEACHING	
THICKNESS	0.0 mm
GUN STROKE	0.0 mm
TCP ADJUSTMENT	0.0 mm

Enter work thickness

【Normal teaching】

Touch fixed side with tip

Welding instruction SVSPOT

【If unable to visually confirm fixed side electrode】

Touch work with movable electrode

Work piece thickness

Register with work piece thickness

Z+ direction

Contact point teaching method (2)

Used Function

- Clearance teaching function (SVSPOTMOV instruction)

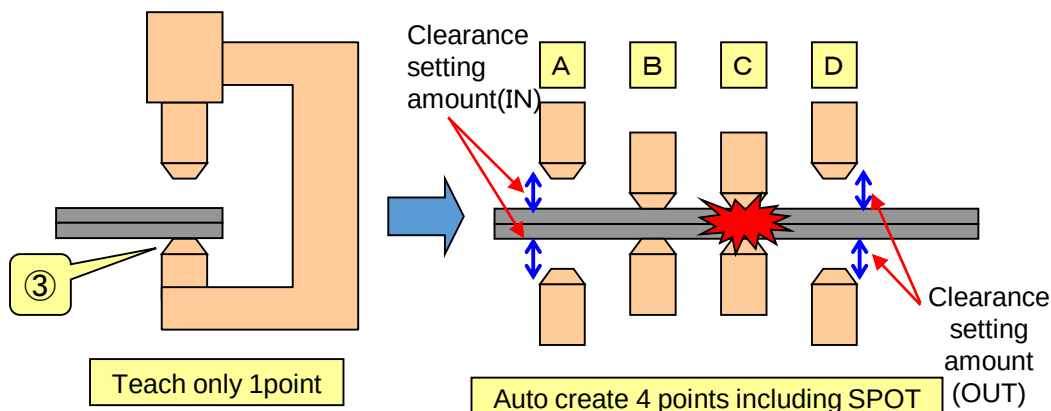
Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.10 Clearance Move Instruction (SVSPOTMOV Instruction)

Functional overview

- Simplify JOB creation by teaching one point using this function; it automatically registers front & back position

- ① Select teaching type from [UPPER-TIP] [LOWER-TIP] [GUN-DOSE]
⇒ See picture on the right
※Below is clearance teaching of 『lower-tip teaching』
- ② Set clearance file
⇒ See picture on the right
- ③ Put lower-tip in contact with work within JOB
- ④ Press [SHIFT] + [Interpolation], display [SVSPOTMOV] and register1 teaching point, A: clearance position, B: contact point, C: SVSPOT instruction, D: automatically create clearance position



【Application condition setting window】

APPLICATION CONDITION SETTING	
APPLI: 1 / 1	
CLEARANCE TEACHING METHOD	LOWER TIP
MAX NUMBER OF WELDER CONNECT	1
WEAR DETECTION	
WEAR DETECT METHOD	RIN
WEAR VALUE CALCULATE METHOD	TOTAL VALUE
ORDER OF WEAR DETECT INSTRUCTION	TWC-A->TWC-B
WEAR COMPENSATE TEACH METHOD	MESSAGE
THICKNESS DETECTION	
THICKNESS DETECTION FUNCTION	VALID
THICKNESS ERROR NOTICE	ALARM
THICKNESS CHECK MODE SELECT GIN#	0
THICKNESS ALARM IGNORE GIN#	0

【Clearance setting window】

CLEARANCE SETTING		
COND NO.: 1 / 32		
MOVING	SQUARE	
Clearance setting		
	IN	OUT
DISTANCE TO UPPER TIP	10.0 mm	15.0 mm
DISTANCE TO LOWER TIP	10.0 mm	15.0 mm
THICKNESS	0.0 mm	Work piece thickness setting

※Amount of clearance can be set separately for both sides (IN) and (OUT)
No settings needed for work piece thickness, when selecting [GUN-DOSE]teaching

Contact point teaching method (3)

Used Function

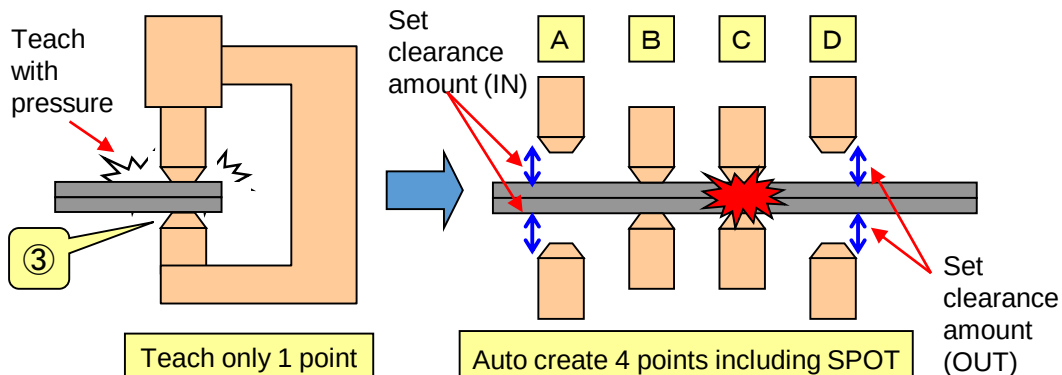
- Press teaching function

Related document

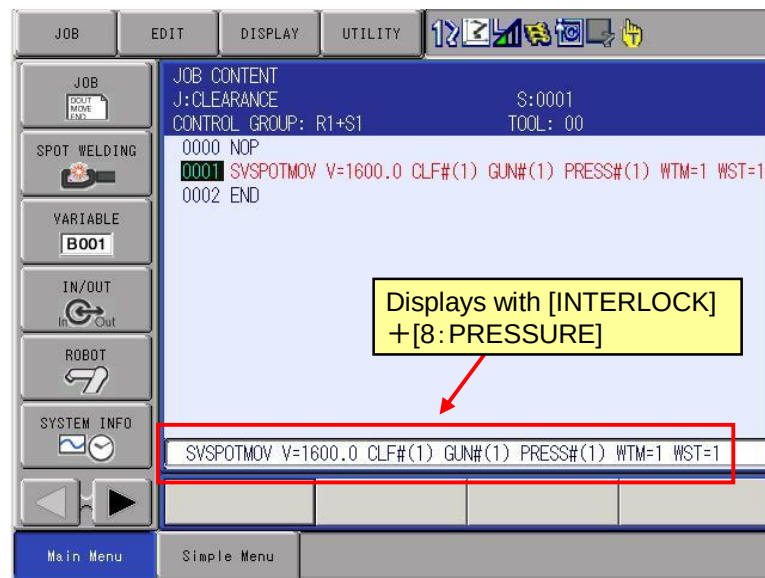
- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.10.7 Press teaching function

Functional overview

- Simplify JOB creation by teaching one point using this function; it automatically registers front & back position
- Select [UPPER-LOWER tip teaching] teaching type
⇒ View diagram on the right in the previous page
 - Set clearance file
⇒ View diagram on the right in the previous page
⇒ However, pressure teach does not require setting of work piece thickness
 - Move LOWER tip to put in contact with work piece, then press [INTERLOCK] + [8:PRESSURE] to display [SVSPOTMOV] in JOB
⇒ See diagram on the right
⇒ 1 point teaching, A: Clearance position, B: Contact point
C: SVSPOT instruction, D: Auto create clearance point



【JOB window】



SVSPOTMOV CLF#(1) GUN#(1) PRESS#(1) WTM=1 WST=1

CLF#(1) : Clearance file number
GUN#(1) : Motor gun number
PRESS#(1) : Pressure condition file
WTM=1 : Welding condition number
WST=1 : Welding activation timing

Disabling gun arm bend compensation

Used Function

- BCOFF tag (SVSPOT instruction SVSPOT MOV instruction)

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.14.6.3 Disabling gun arm bend compensation

Functional overview

- Added tag that disables gun arm bend compensation, using spot welding instruction (SVSPOT instruction, SVSPOTMOV instruction)
- Faster spot motion is possible, as setting can be executed at each teaching point, with removal of robot's bend compensation operation

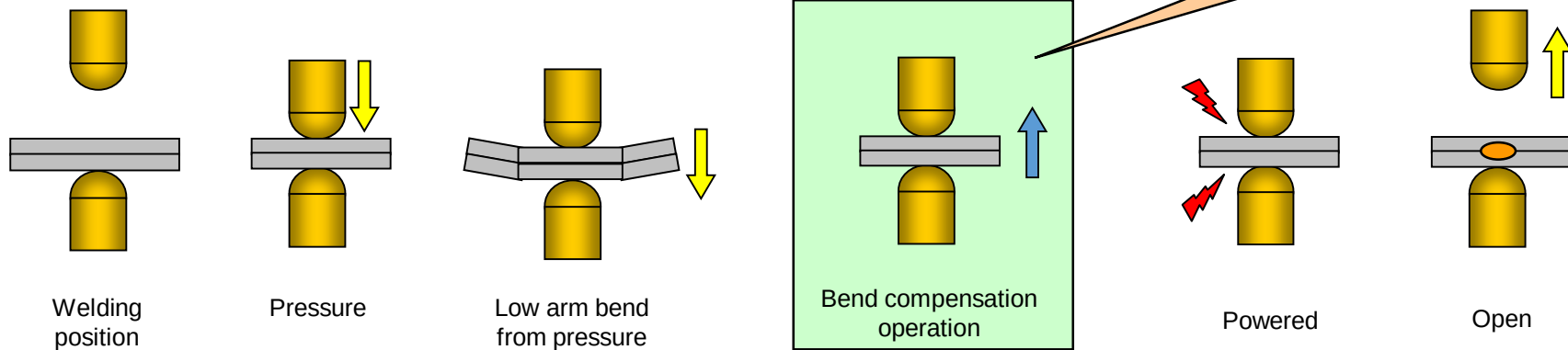
●SVSPOT instruction

SVSPOT GUN#(1) PRESS#(1) WTM=1 WST=1 **BCOFF**
 Gun number Pressure file Start condition Start timing Disable bend compensation

●SVSPOTMOV instruction

SVSPOTMOV CLF#(1) GUN#(1) PRESS#(1) WTM=1 WST=1 **BCOFF**
 Clearance file Gun number Pressure file Start condition Start timing Disable bend compensation

Powered without
performing
compensation
operation



Setup of servo-dresser

Used Function

- Servo-dresser model

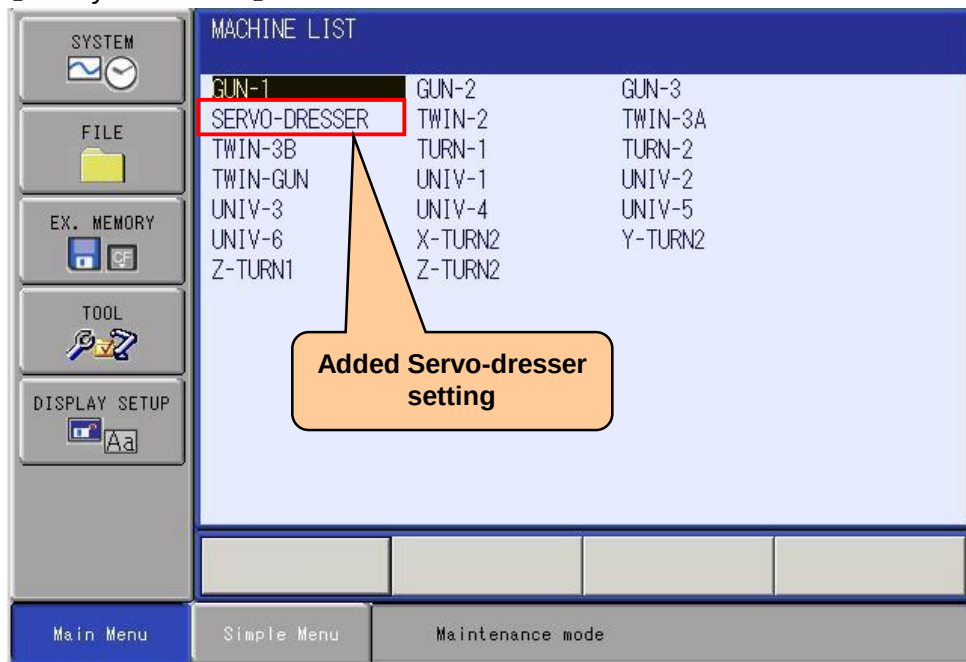
Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.11 Tip Dressing Instruction (SVDRESMOV INSTRUCTION)

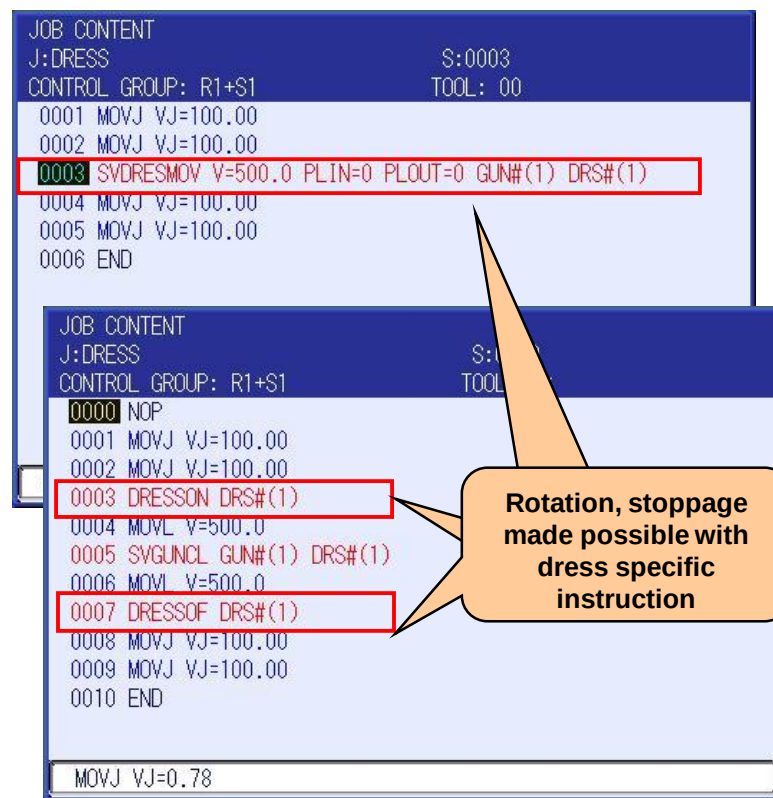
Functional overview

- Settings of Servo-dresser has been added to the external axis settings item, and enabled rotation that does not control position.
- Rotation and stoppage has been enabled without being dependent on control group.

【Set system mode】



【Refer to Servo-dresser JOB】



Tip dress motion

Used Function

- SVDRESMOV instruction

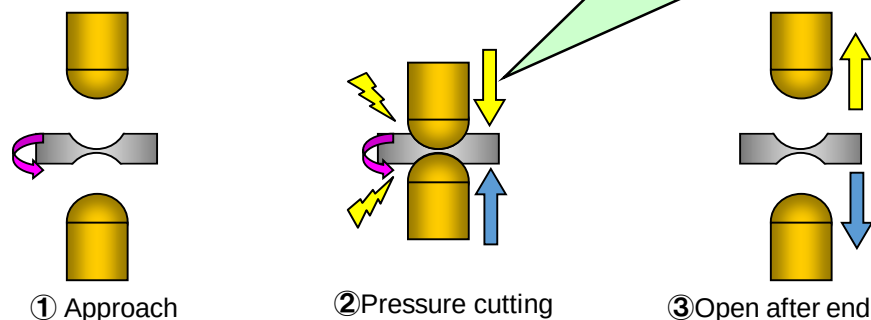
Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.11.3 Tip Dress Condition 9.11.5 Tip Dress Instruction

Functional overview

- Created tip dress motion specific instruction and settings file
- Teaching reduction from 1 point teaching stabilizes cutting amount of upper and lower tip

【SVDRESMOV motion】



JOB CONTENT

J:DRESS

S:0000

CONTROL GROUP: R1+S1

TOOL: **

0000 NOP

0001 MOVJ VJ=100.00

0002 SVDRESMOV V=500.0 PLIN=0 PLOUT=0 GUN#(1) DRS#(1)

0003 MOVJ VJ=100.00

0004 END

1 specific instruction line only

【Tip dress condition window】

Manage settings of pressure, time, clearance amount, and dresser condition with tip dress condition file

TIP DRESS CONDITION			
FILE NO.: 1 / 16			
DRESSER	S2		
PRESS CONDITION			
TOUCH SPEED	5	%	
1ST PRESS	1000	N	1.00 sec
2ND PRESS	0	N	0.00 sec
CLEARANCE CONDITION			
DISTANCE TO UPPER TIP	20.0	mm	
DISTANCE TO LOWER TIP	20.0	mm	
THICKNESS	0.0	mm	
ROTATION WAIT TIME	0.00	sec	
IO CONDITION			
DRESS EXECUTING	OUT#	----	
SERVO DRESSER CONDITION			
ROTATION DIRECTION	+		
ROTATION SPEED (1ST PRESS)	100	rpm	
ROTATION SPEED (2ND PRESS)	0	rpm	
SPEED FLUCTUATION LIMIT	10	%	

Wear detection

Used Function

- Wear detection (SVGUNCL instruction)

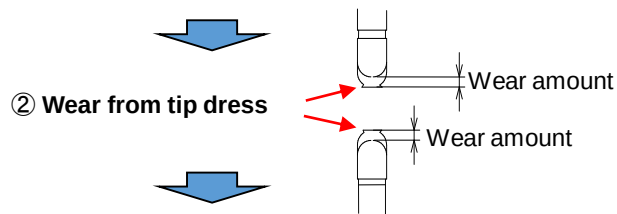
Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.12.2 Wear Detection

Functional overview

- It is possible to detect (measure) tip (electrode) wear amount of fixed side and movable side independently (from JOB operation)
- It is possible to apply for example to measured result of wear compensation operation.

① Register standard number → Execute [wear amount detection operation] after fitting new tip



③ Detect wear amount → Execute wear amount detection operation

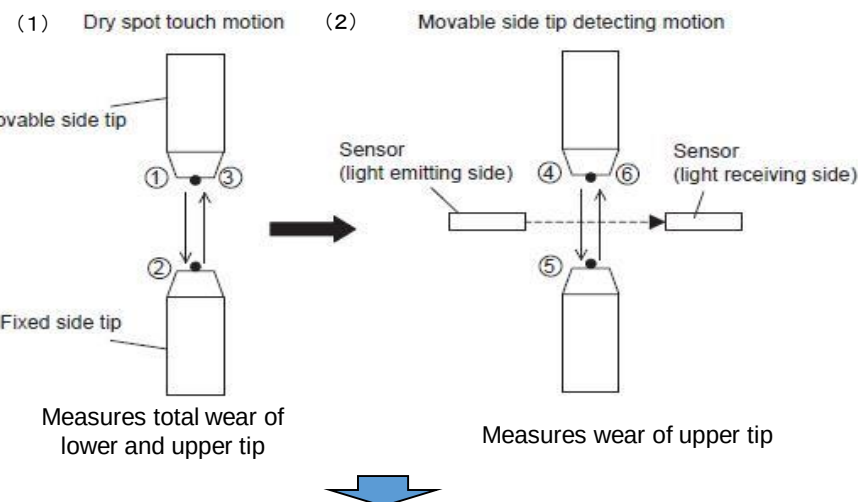
SPOT SUPERVISION			
GUN NO.: 1			
WELD COUNT			
WELD COUNT	0	0	OUT# ****
RESET COUNT			IN# ****
WEAR DETECTION(M:MOVABLE SIDE F:FIXED SIDE)			
WEAR(M)	-25.0 mm	0.0 mm	OUT# ****
WEAR(F)	-25.0 mm	0.0 mm	OUT# ****
RESET WEAR(M)			IN# ****
RESET WEAR(F)			IN# ****
TIP MOUNTING ERROR(M)	0.0 mm		
TIP MOUNTING ERROR(F)	0.0 mm		
BASE POS(M)	*.* mm		
BASE POS(F)	0.0 mm		
THICKNESS DETECTION			
DETECTED THICKNESS	0.0 mm		M 000

● Possibility to output external replacement to set the tolerance

● Wear amount can be confirmed on the spot management window

● Value is entered when basic position is registered

<Example of wear amount detection motion>



Difference between total wear amount and upper-tip wear amount is the lower tip wear amount

JOB example of wear detection motion

- ① MOVJ
- ② SVGUNCL GUN#(1) PRESSTWC **TWC-A (dry spot)**
- ③ MOVJ
- ④ MOVJ
- ⑤ SVGUNCL GUN#(1) PRESSTWC **TWC-B (detect sensor)**
- ⑥ MOVJ

Tip wear compensation

Used Function

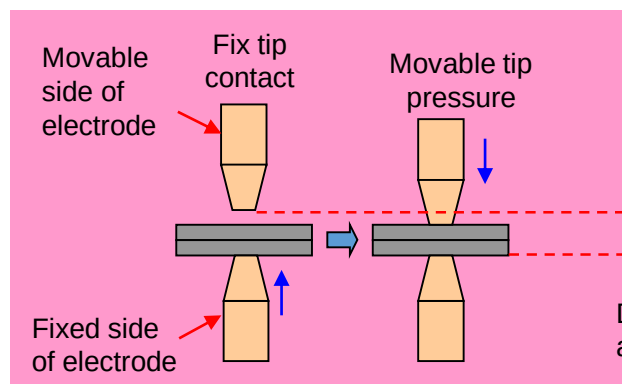
- Wear compensation (SVSPOT instruction, SVSPOTMOV instruction, SVDRESMOV instruction)

Related document

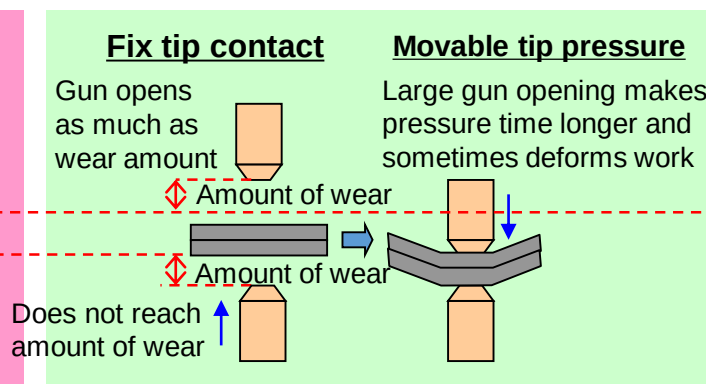
- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.12.4 Wear Compensation

Functional overview

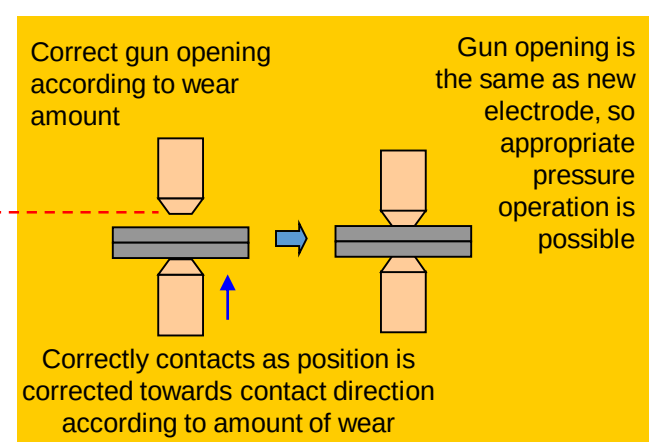
- Uses tip wear amount measured by wear detector to correct contact position with work to the position before wear begins.
- Wear amount is automatically corrected with wear detection, enabling to teach without having to consider state of tip wear.



Initial teaching state for
pressure operation with new electrode

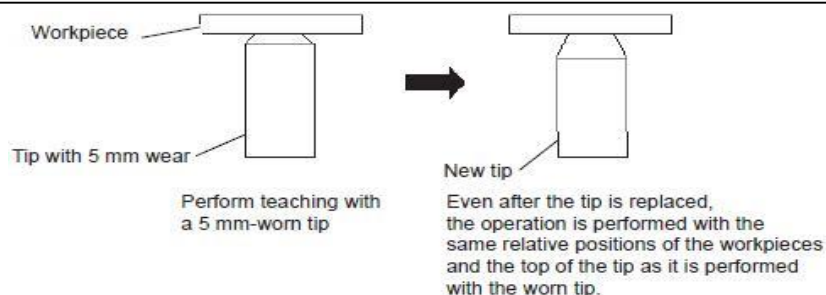


No wear compensation for
pressure operation with worn electrode



Wear compensation for
worn electrode

- Amount of wear is reflected in position registration, when teaching with a worn tip



※ Wear detection and compensation is possible also with fixed gun.

(See next page)

Wear detection and compensation with fixed gun

Used Function

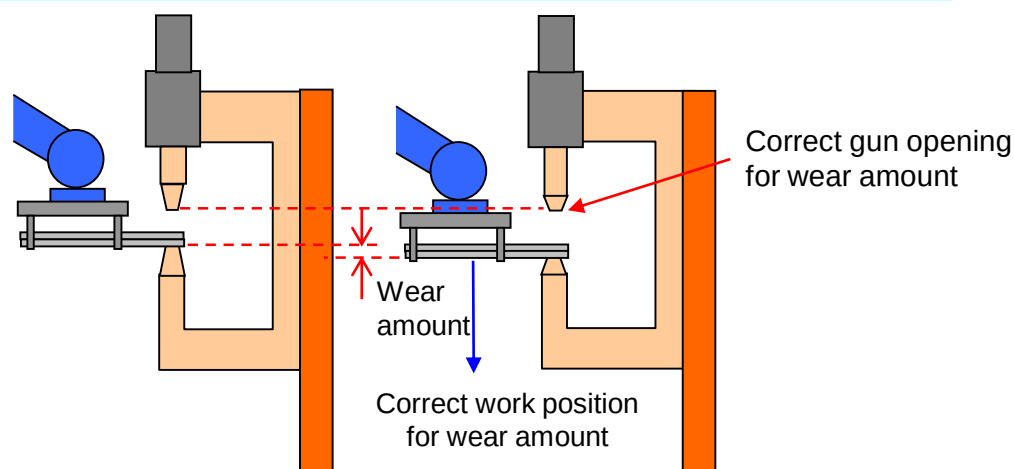
- Wear detection (SVGUNCL instruction), wear compensation (SVSPOT, SVSPOTMOV instruction)

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.12.5 *Tip Wear Compensation for Fixed Gun*

Functional overview

- Wear detection and compensation possible even with fixed gun



Pressure operation with new electrode
Initial teaching state

When electrode worn
Includes wear compensation

<Difference with normal wear detection>

Fixed gun cannot move the gun body, so it corrects position of work held by robot.

※1. Register user coordinate according to gun pressure direction 2. Set gun installation mode to a fixed position 3. Set registered user coordinate number

GUN CONDITION					
GUN NO.: 1					
SETTING	DONE				
GUN TYPE	C-GUN				
WELDER NO.	1				
TORQUE DIR	+				
	PULSE	STROKE		TORQUE	PRESSURE
1	2048	5.0 mm		12.5 %	500 N
2	4096	10.0 mm		25.0 %	1000 N
3	20480	50.0 mm		37.5 %	1500 N
4	40960	100.0 mm		50.0 %	2000 N
5	0	0.0 mm		62.5 %	2500 N
6	0	0.0 mm		75.0 %	3000 N
7	0	0.0 mm		87.5 %	3500 N
8	0	0.0 mm		100.0 %	4000 N
9	0	0.0 mm		0.0 %	0 N
10	0	0.0 mm		0.0 %	0 N
11	0	0.0 mm		0.0 %	0 N
12	0	0.0 mm		0.0 %	0 N
MAX PRESSURE	4000 N				
PRESSURE COMPENSATION	50 N				
GUN ARM BEND COEF.	X	0.000 mm/1000N		Y	0.000 mm/1000N
				Z	0.500 mm/1000N
GUN PUSHING COEF	1.000 mm/1000N				
GUN INSTALLATION STATUS	FIXED				
USER COORDINATE NO.	1				

Reset amount of wear by external signal

Used Function

- Clear input wear amount

Related document

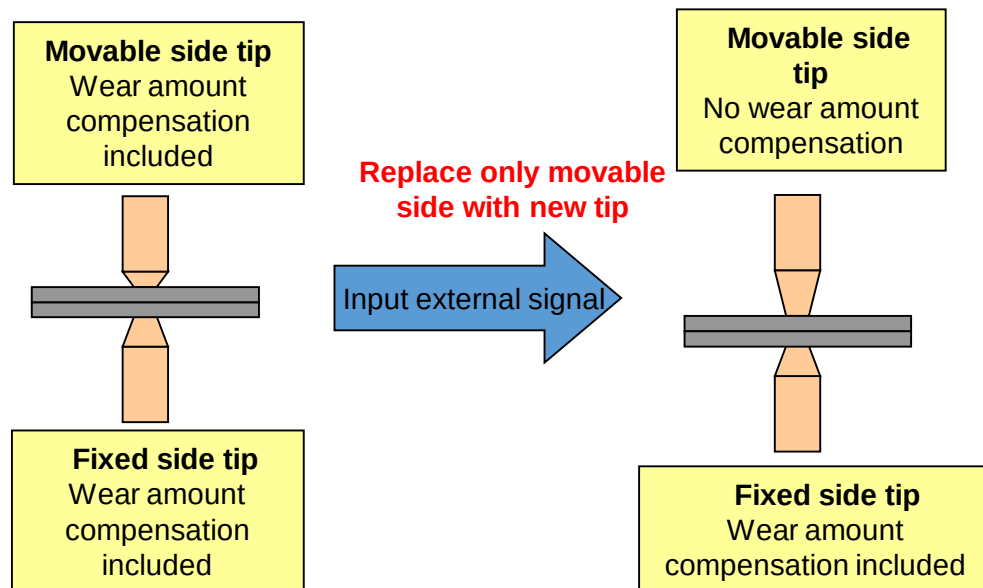
- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.12.3 Spot Supervision Window Setting

Functional overview

- Possibility to reset tip wear amount with external signal
- Set fixed side, movable side separately
- Measurement operation immediately after tip replacement will be unnecessary

(Example of use)

Case of tip replacement of movable side (only)



【Spot supervision window】

Set general input number to reset wear amount with spot supervision window

SPOT SUPERVISION		CURRENT	TOLERANCE	SETTING
GUN NO.: 1				
WELD COUNT				
WELD COUNT	0	0	OUT#	****
RESET COUNT			IN#	****
WEAR DETECTION(M:MOVABLE SIDE F:FIXED SIDE)				
WEAR(M)	-25.0 mm	0.0 mm	OUT#	****
WEAR(F)	-25.0 mm	0.0 mm	OUT#	****
RESET WEAR(M)			IN#	****
RESET WEAR(F)			IN#	****
TIP MOUNTING ERROR(M)	0.0 mm			
TIP MOUNTING ERROR(F)	0.0 mm			
BASE POS(M)	*,* mm			
BASE POS(F)	0.0 mm			
THICKNESS DETECTION				
DETECTED THICKNESS	0.0 mm		M	000
WEAR DETECT CONDITION				
TOUCH SPEED			5 %	
DETECT PRESSURE			1000 N	
WEAR RATIO(FIXED SIDE)			50 %	
WEAR COMPENSATION OFFSET(FIXED SIDE)			0.00 mm	
WEAR DETECT SENSOR DIN NO.			1	
WEAR DETECT SENSOR POLARITY			OFF->ON	

Applying wear amount detection result

Used Function

- Load wear amount on JOB

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.12.7 Wear Amount Loading

Functional overview

- The following applications are possible by loading into JOB, the amount of wear detected

- Make decisions based only on wear alarm, wear limitation
- Possibility to manage tip dress amount
- Transmit amount of wear to upper panel through CIO ladder

SPOT SUPERVISION			
GUN NO.:	CURRENT	TOLERANCE	SETTING
WEAR DETECTION(M:MOVABLE SIDE, F:FIXED SIDE)			
WEAR(M)	-25.0 mm	0.0 mm	****
WEAR(F)	-25.0 mm	0.0 mm	****

	(Unit: μm)
\$D30	Gun 1 movable side (upper) wear amount
\$D31	Gun 1 fixed side (lower) wear amount
\$D32	Gun 2 movable side (upper) wear amount
\$D33	Gun 2 fixed side (lower) wear amount
\$D34	Gun 3 movable side (upper) wear amount
\$D35	Gun 3 fixed side (lower) wear amount

\$D48	Gun 10 movable side (upper) wear amount
\$D49	Gun 10 fixed side (lower) wear amount
\$D50	Gun 11 movable side (upper) wear amount
\$D51	Gun 11 fixed side (lower) wear amount
\$D52	Gun 12 movable side (upper) wear amount
\$D53	Gun 12 fixed side (lower) wear amount

Wear amount of the current value, which is displayed on the welding diagnostic window is stored in the variable \$D

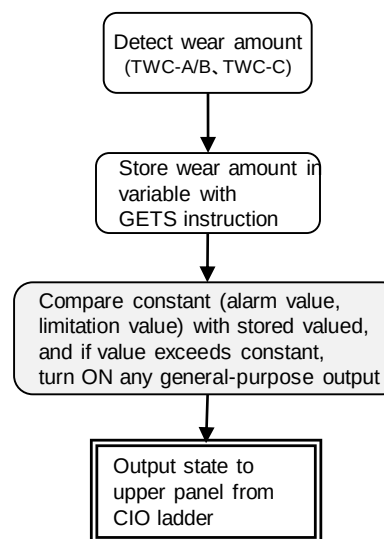
Store \$D variable in D variable using JOB

<Example>

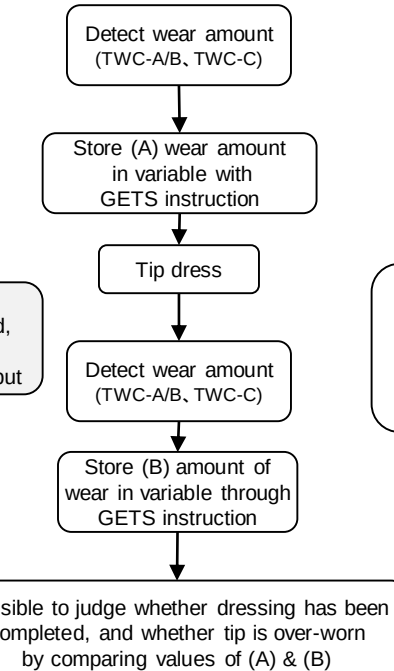
GETS D000 \$D030

The wear amount of Gun 1 (movable side) is stored in D000.

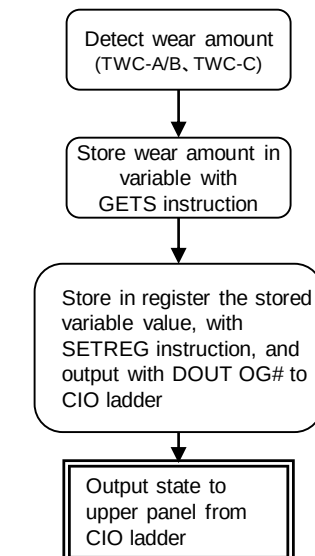
Application example①



Application example②



Application example③



These boxes show JOBS.

Previously, processing of wear amount was executed by a specific output to CIO ladder. It can now be done by using JOBS which facilitate visual understanding of internal processing.

Tip mounting position error compensation

Used Function

- Tip mounting position error detection

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.12.8 Tip Mounting Position Error Detection

Functional overview

- By handling the causes separately, the real wear amount of the tip itself can be handled to decide the tip's ideal replacement timing.
- The cause of the pressure position error when pressure is applied can be sorted to two causes; tip wear and tip mounting position error.

Even with a new tip, as tip gets stuck deeply into the shank, the detected wear amount will equal the depth the tip got stuck by.



The replacement period comes faster than usual as the amount the tip got stuck by, will add to the actual wear amount, even if the tip can still be used.



In order to manage tip wear amount correctly, the tip wear amount and tip mounting error will be managed separately.

[Spot supervision window]

SPOT SUPERVISION			
GUN NO.: 1	CURRENT	TOLERANCE	SETTING
WELD COUNT			
WELD COUNT	0	0	OUT# ****
RESET COUNT			IN# ****
WEAR DETECTION(M:MOVABLE SIDE F:FIXED SIDE)			
WEAR(M)	-25.0 mm	0.0 mm	OUT# ****
WEAR(F)	-25.0 mm	0.0 mm	OUT# ****
RESET WEAR(M)			TMM ****
RESET WEAR(F)			
TIP MOUNTING ERROR(M)	0.0 mm		
TIP MOUNTING ERROR(F)	0.0 mm		
BASE POS(M)	*,* mm		
BASE POS(F)	0.0 mm		

Display current tip mounting error of fixed electrode side

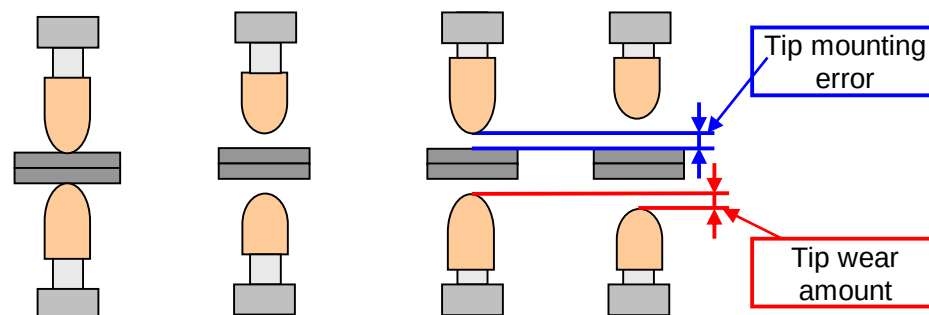
Display current tip mounting error of movable electrode side

Normal

Wear amount: Yes
Mounting error: No

Wear amount: No
Mounting error: Yes

Wear amount: Yes
Mounting error: Yes



Tip mounting error

Tip wear amount

Lost-tip detection

Used Function

- Lost-tip detection

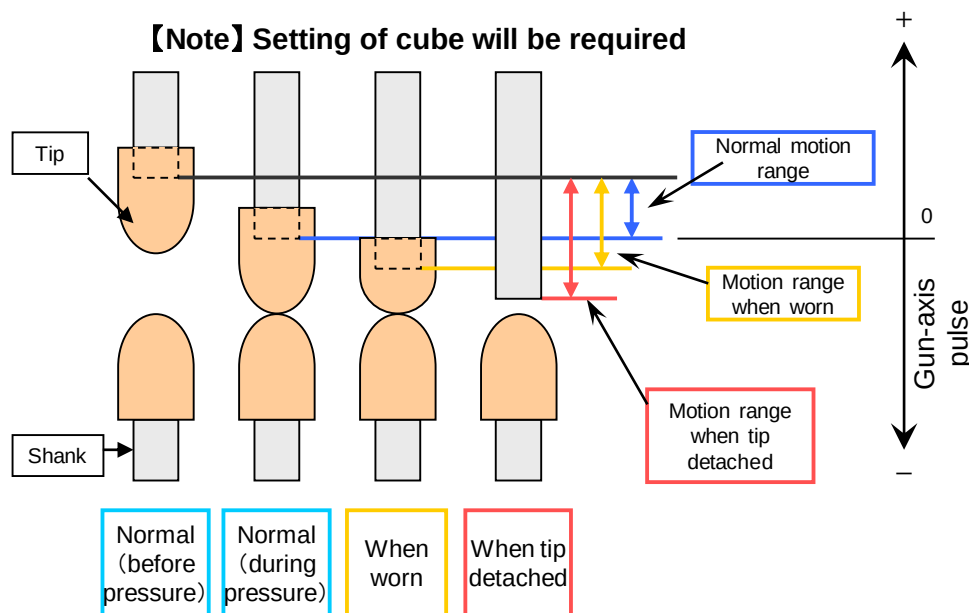
Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.4.5 Setting the Lost-tip Detection Value

Functional overview

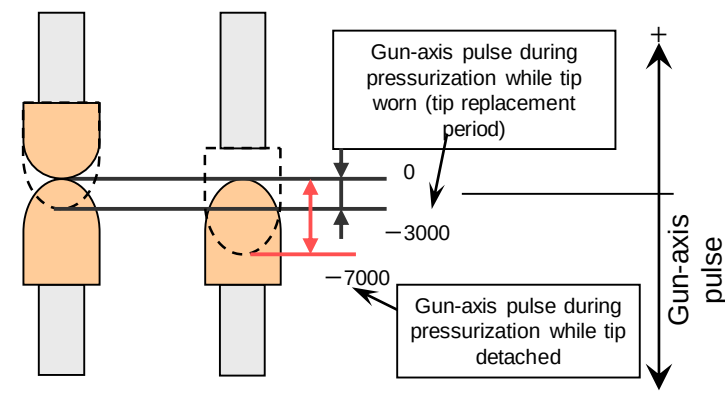
- The gun-axis pulse can be monitored to output a signal when the tips of motor gun are detached.
- There is a signal when the tips are detached, and the shank moves out of its normal motion range.

【Note】Setting of cube will be required



- Outputs signal externally, when it judges operation is not normal/tip detached

【Example】



- When gun-axis pulse is in a range of ± 3000

When tip is mounted

- When gun-axis pulse is in a range of -3000 to -7000

When tip is detached

Outputs to external signal

Operates according to signal (stop robot, sound alarm)

Detection function of tip detachment

Interference from 1 to 4 intrusion ban etc.

Shorten cycle time

Used Function

- High speed spot welding function

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.13 High Speed Spot Welding Function

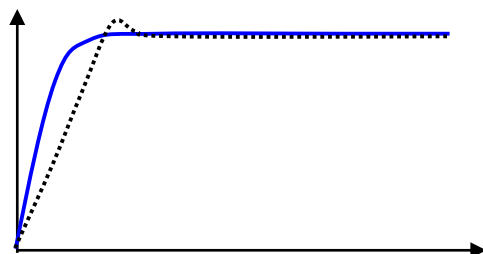
Functional overview

This function is created for the purpose of reducing the cycle time of a spot welding operation, and realizing pressurization without overshooting, by improving the control of the manipulator's motion and the motor gun's pressure control.

※Function realizes max. 35% cycle time reduction.

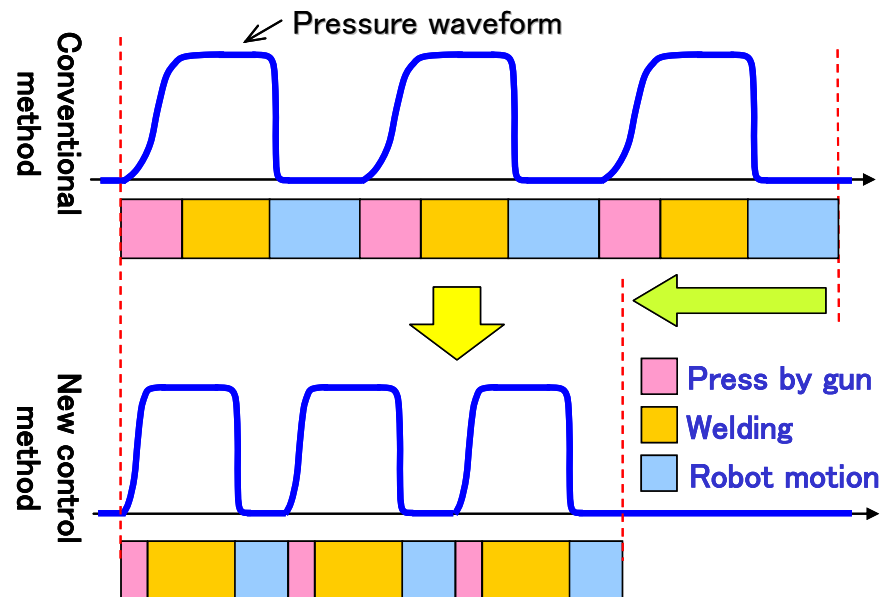
(Time reduction varies with motion pattern and motor gun)

Actual pressure



..... : Before speed up — : After speed up

Waveform image of pressurization without overshooting



Waveform image when new control method is applied

Important:

- Execute auto-tuning of motor gun
- The motor gun auto tuning function is a function that automatically repeats pressurization motion, and fixes dynamic characteristic of motor gun, in 5 to 10 min.

Detection of work miss-setting

Used Function

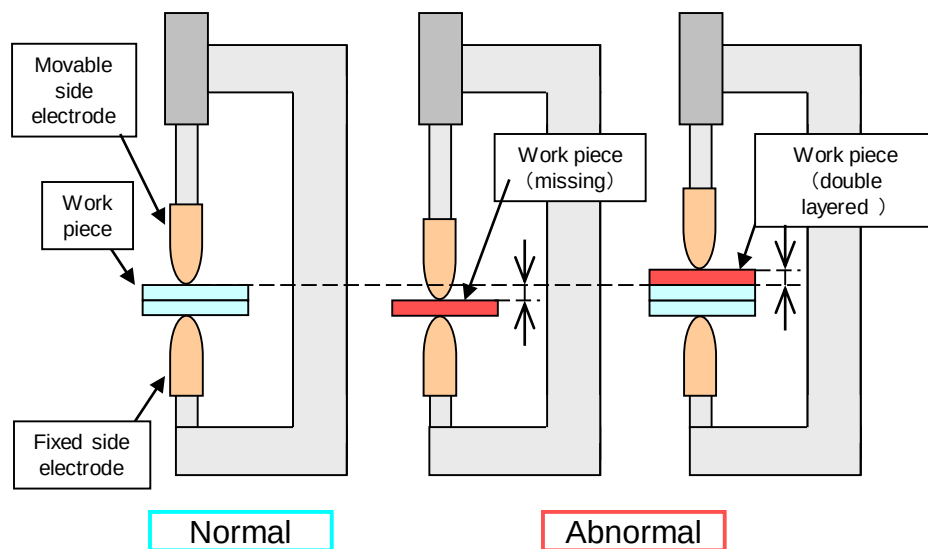
- Work piece thickness detection function

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.14.8 Work piece Thickness Detection Function

Functional overview

- This function monitors the thickness of work piece at every welding point, when executing the SVSPOT instruction and SVSPOTMOV instruction.
- An alarm can be generated if the work piece is missing.

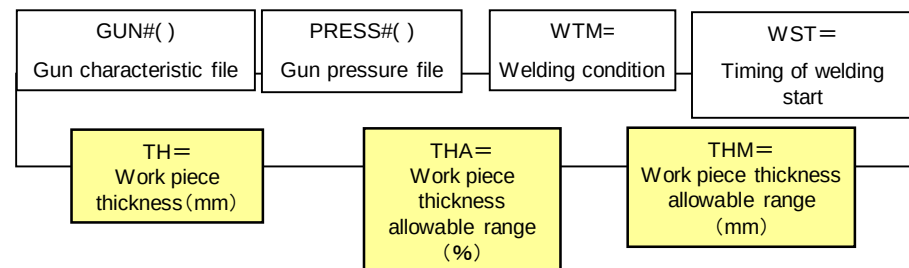


When work piece missing, set as double layered, or set incorrectly, the function compares with normal setting and changes contact point with work piece.

When using this function, it is possible to monitor whether work piece is missing, double layered, or set incorrectly without a sensor.

【Monitoring method (spot instruction)】

SVSPOT/SVSPOTMOV (spot welding instruction)



- Set up of work piece thickness ("TH") with SVSPOT instruction detail. Otherwise, measure each welding point work piece thickness with thickness measurement mode.
- Set up allowable work piece thickness (managed with tags "THA" or "THM") with SVSPOT instruction details.
- ※THA: Select allowable range of work piece thickness (TH) with percentage (%)
- ※THM: Select allowable range of work piece thickness (TH) with absolute value (mm)
- "Work piece thickness abnormality" alarm will occur if error exceeds allowable range when comparing thickness (TH) and allowable thickness range values (THA or THM).

Other related settings

Used Function

- Application related settings

Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.4.7 Application Condition Setting

Functional overview

- Spot application related function settings have been compiled
- Change of settings according to specification can be executed easily.

【Application related settings window】

APPLICATION CONDITION SETTING	
APPLI: 1 / 1	
CLEARANCE TEACHING METHOD	LOWER TIP
MAX NUMBER OF WELDER CONNECT	1
WEAR DETECTION	
WEAR DETECT METHOD	RIN
WEAR VALUE CALCULATE METHOD	TOTAL VALUE
ORDER OF WEAR DETECT INSTRUCTION	TWC-A->TWC-B
WEAR COMPENSATE TEACH METHOD	MESSAGE
THICKNESS DETECTION	
THICKNESS DETECTION FUNCTION	VALID
THICKNESS ERROR NOTICE	ALARM
THICKNESS CHECK MODE SELECT GIN#	0
THICKNESS ALARM IGNORE GIN#	0
WELD GROUP	
WELD GROUP NUMBER	0
WELD GROUP ORIGINAL NO.	1 Origin
WELD COMPLETE SIGNAL	
WELD COMPLETE DETECT METHOD	BIT UP
WELD COMPLETE OFF WAIT TIME	0 sec

WEAR THRESHOLD	
WEAR WARNING VALUE(MOV)	0.000 mm
WEAR WARNING VALUE(FIX)	0.000 mm
WEAR MINUS THRESHOLD(MOV)	0.000 mm
WEAR MINUS THRESHOLD(FIX)	0.000 mm
WEAR DIFF THRESHOLD(+) (MOV)	0.000 mm
WEAR DIFF THRESHOLD(+) (FIX)	0.000 mm
WEAR DIFF THRESHOLD(-) (MOV)	0.000 mm
WEAR DIFF THRESHOLD(-) (FIX)	0.000 mm
WEAR NEW TIP THRESHOLD(MOV)	0.000 mm
WEAR NEW TIP THRESHOLD(FIX)	0.000 mm
NADEX WELDER	
ERROR DISP TYPE	DISP ALARM
ALARM SIGNAL SELECT BIT(WELD1)	6
ERROR CODE BIT(WELD1)	255
OTHERS	
AUTO TOOL NO. SELECT FOR GUN	VALID
MOTION WHEN MANUAL HANDLING	CONFIRM
WEAR COMP.METHOD FOR TWIN GUN	NO COMP

Use DX100 condition file

Used Function

- Convert file from DX100 ⇒ DX200

Related document

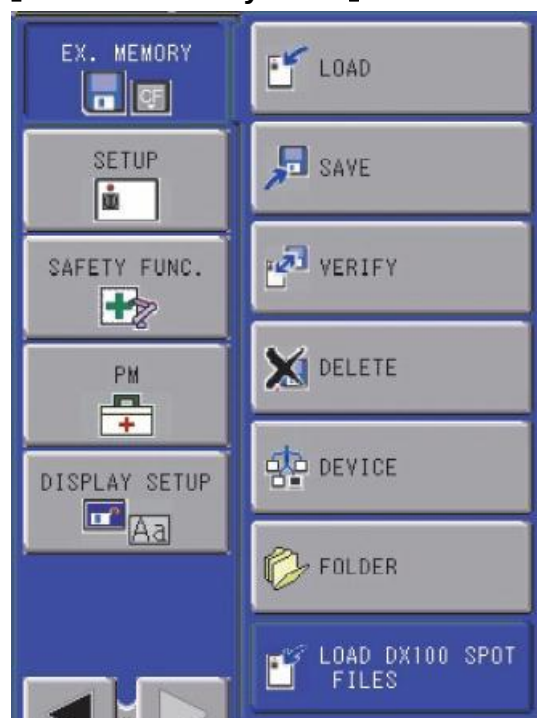
- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.15 Loading the DX100 Motor Gun Condition File

Functional overview

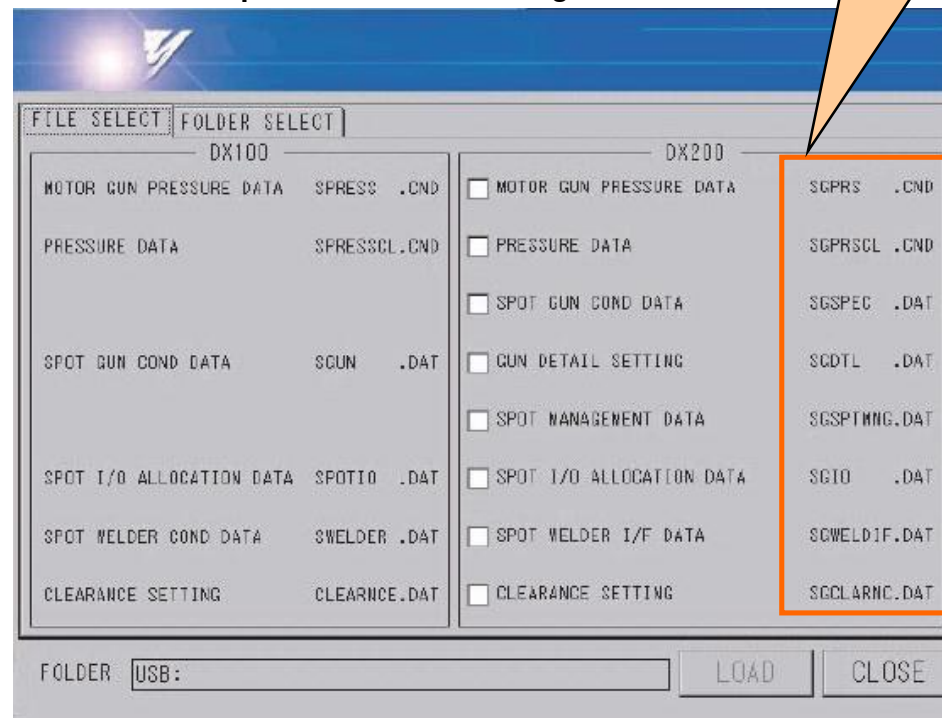
- Each file structure and name of motor gun of DX200 have been renewed, but it is also possible to load DX100 data.
- We are preparing an app that converts each condition file data of DX100 to DX200 structure

Renewal of each file structure, name!

【External memory menu】



【Condition file upload of DX100 motor gun】



Compatibility with special 2 axis gun

Used Function

- GUN 2 setup (twin gun)

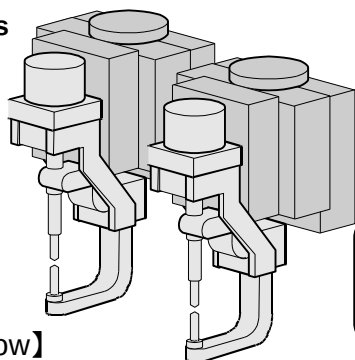
Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN

Functional overview

- Enables to control while maximizing the potential of special motor guns. For example by controlling 2 motor guns simultaneously with 2 axis guns

Image of 2 motor guns



Set up wear compensation on operation

【Application related condition settings window】

APPLICATION CONDITION SETTING
APPLI: 1 / 1
NADEX WELDER
ERROR DISP TYPE
ALARM SIGNAL SELECT BIT(WELD1)
ERROR CODE BIT(WELD1)
OHTERS
AUTO TOOL NO. SELECT FOR GUN
MOTION WHEN MANUAL HANDLING
WEAR COMP.METHOD FOR TWIN GUN

DISP ALARM
6
255
NO COMP
USE 1ST GUN
USE 2ND GUN
AVG. VALUE

【Welding JOB example】

```
JOB CONTENT
J:GUN2                      S:0003
CONTROL GROUP: R1+S1        TOOL: 00
0000 NOP
0001 MOVJ VJ=0.78
0002 SVSPOT GUN#(1) PRESS#(1) WTM=1 WST=1 GUN#(2) PRESS#(2) WTM=2 WST=1
0003 MOVJ VJ=0.78
0004 SVSPOT GUN#(1) PRESS#(1) WTM=1 WST=1
0005 MOVJ VJ=0.78
0006 SVSPOT GUN#(2) PRESS#(1) WTM=1 WST=1
0007 MOVJ VJ=0.78
0008 END
```

Simultaneous welding of both axis

Weld only first axis

Weld only second axis

DETAIL EDIT
SVSPOT
GUN COND FILE GUN#() 1 ▼
GUN PRESS FILE PRESS#() 1 ▼
WELD COND NO. WTM= 1 ▼
STARTUP TIMING WST= 1 ▼
START STRK POS UNUSED
WELD GRP OUT UNUSED
THICKNESS UNUSED
GUN COND FILE GUN#() 2 ▼
GUN PRESS FILE PRESS#() 2 ▼
WELD COND NO. WTM= 2 ▼
STARTUP TIMING WST= 1 ▼
START STRK POS UNUSED
WELD GRP OUT UNUSED

Detail settings of each axis

Shorter cycle time

OPTION

Used Function

- Control learning function

Related document

- DX200 OPTIONS INSTRUCTIONS FOR LEARNING CONTROL FUNCTION

Functional overview

Without troublesome operations and sensor, spot robot's cycle time can be shortened only by executing JOBs.

- Available for continuous welding point (SVSPOTMOV instruction).
- Possible to learn up to 200 instructions simultaneously.
- Possible to deactivate each JOB/instruction independently if it is not necessary.
- Possible to monitor the progress of the learning situation.
- Possible to set the necessary I/O signals on one window.

Effect

About 5% cycle time shortened

※The effect changes according to the characteristic of spot gun, welding conditions, JOB, etc.

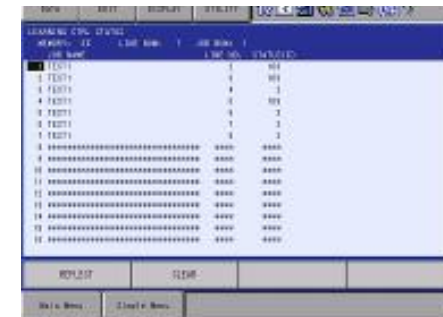
Feature

A sensor and cable are unnecessary.

**No need to edit JOBs.
Only Playback is needed.**

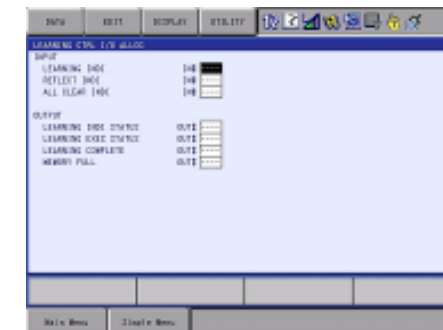
【Control learning implementation status window】

Display progress of control learning, for example JOB name, line number etc.



【Control learning input/output allocation window】

By general input/output allocation, it is possible to execute same operation as operation by buttons via external signals



Standard robot control with fixed gun

OPTION

Used Function

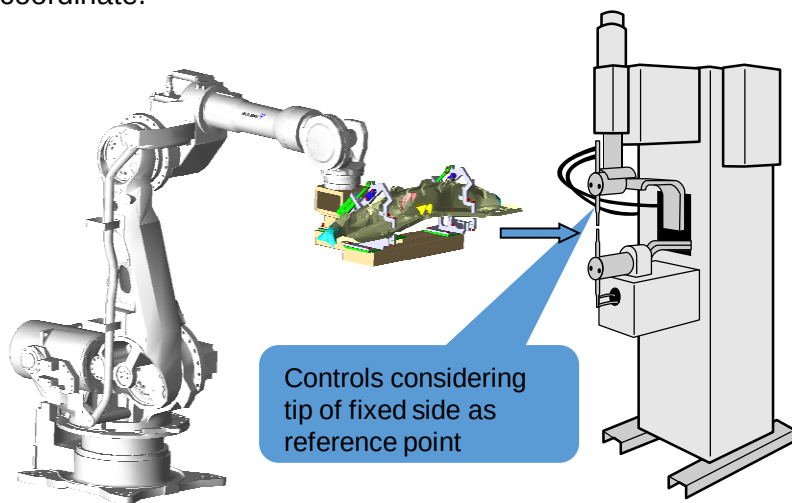
- Control function of external reference point

Functional overview

- Function enabling for example teaching/playback by considering a point in space (ex. fixed side tip of fixed gun) as robot control point.
- Use for a system where robot carries work piece, for example, a system of work piece carrying robot & fixed type gun specification.

* Using gun condition file, set gun installation mode to fixed gun, and set user coordination that executes wear compensation (see page 12)

* It defines external reference point using origin (ORG) of user coordinate.



Related document

- DX200 OPERATOR'S MANUAL FOR SPOT WELDING USING MOTOR GUN: 9.12.5 Tip Wear Compensation for Fixed Gun

【Settings window of user coordinate】

DATA	EDIT	DISPLAY	UTILITY
JOB OUT MOVE END SPOT WELDING VARIABLE B001 USER COORDINATE USER COORD NO.: 01 R1 :S 0 TOOL: 00 SET POS. ORG L 0 < STATUS > U 0 ORG : ● R 0 XX : ● B 0 XY : ● T 0			

【User coordinate setting result window】

* Distance from robot origin to user coordinate origin (external reference point)

DATA	EDIT	DISPLAY	UTILITY
JOB OUT MOVE END SPOT WELDING VARIABLE B001 USER COORDINATE USER COORD NO.: 1 / 63 NAME: X 1775.000 mm Rx -0.0038 deg. Y 0.000 mm Ry -0.0033 deg. Z 1450.000 mm Rz 0.0000 deg.			

* Need to set (+) direction of Z coordinate to movable side electrode (set each compensation direction)

Welding conditions settings with pendant

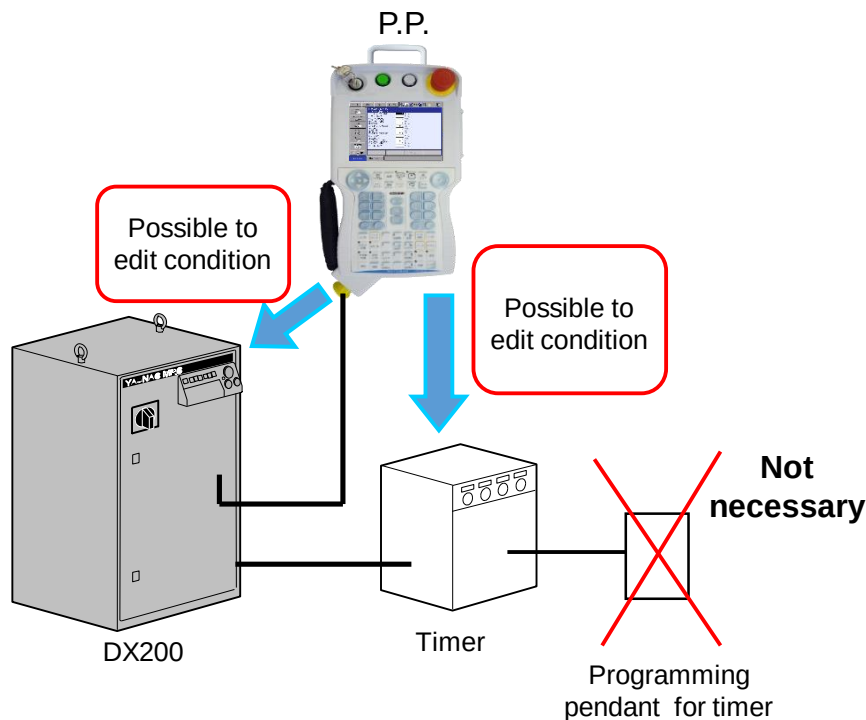
OPTION

Used Function

- Integrated timer function

Functional overview

- Function enables to edit using the robot pendant, the timer's welding condition (welding current, welding time) which is usually managed individually.
- With DX200, the circuit board (XFB01B-2) is not necessary and D-NET transmission circuit board can be used.

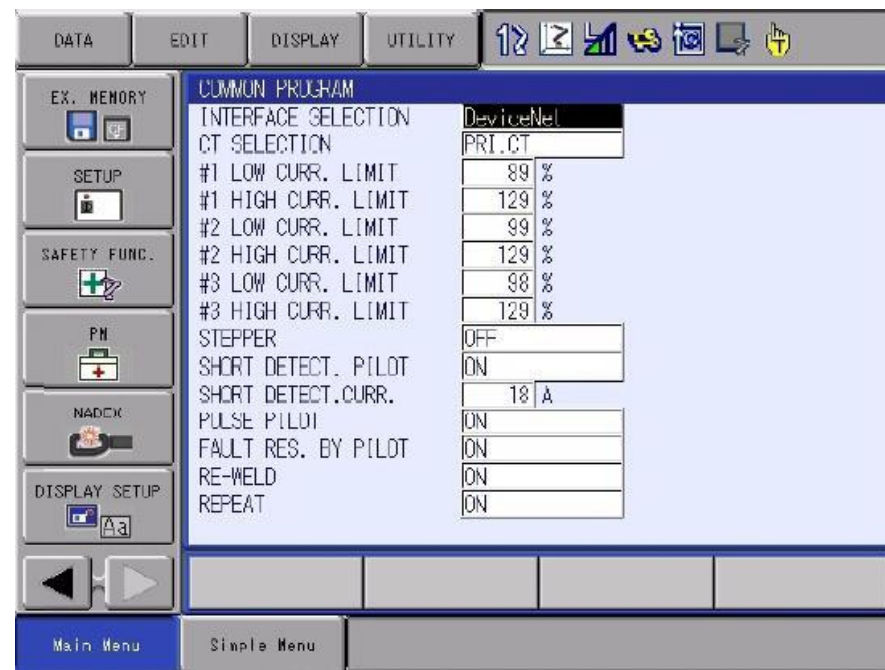


Related document

- DX200 OPTIONS DeviceNet COMMUNICATIONS FUNCTION
4.8 Communications with the NADEX Timer

※ Depending on timer model, this function may not be applicable
Please check before use

【Window to edit timer welding condition on pendant P.P】



※ The above window shows transmission window with NADEX timer.

Traceability of welding result

OPTION

Used Function

- Spot monitor function

Related document

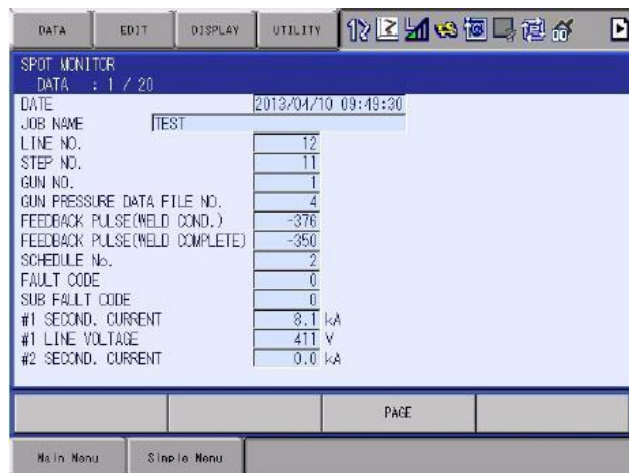
- DX200 OPTIONS INSTRUCTIONS FOR SPOT MONITOR FUNCTION

Functional overview

- Centrally manage DX200 welding condition and welding result of timer (which was managed independently before), and view from the programming pendant screen.
- Traceability of welding result is enabled by regularly saving data onto external memory device.

●When you want to confirm welding result in real time (logging)

- Saved on DX200 (about 200 teaching points)
- Shown on programming pendant



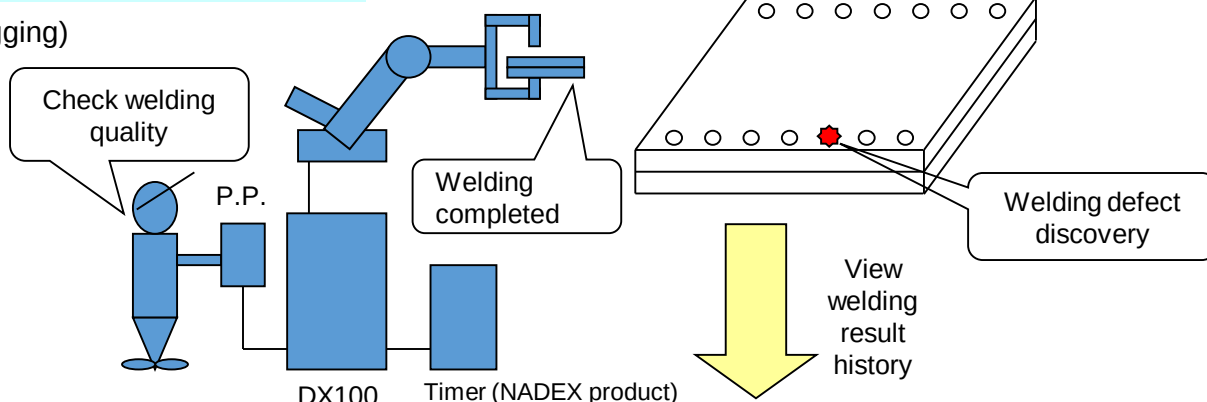
P.P screen

- ※1 Data from timer differs depending on model/versions
- ※2 Use timer made by NADEX (use integrate timer function)
- ※3 Use I/F memory additional circuit board

●When you want to confirm past spot welding result (traceability)

- Saved on external memory device (USB or CF)
- Display on PC (display as CSV file type)

Example: welding defect



PC screen

1	2	3	4	5	6	7	8	9
NO.	DATE	TIME	JOB NAME	LINE NO.	STEP NO.	GUN NO.	GUN PRESSURE DATA FILE NO.	FEEDBACK PULSE(WELD COND.)
1	2013/4/10	10:09:40	TEST	12	11	1	4	-372
2	2013/4/10	10:09:39	TEST	11	10	1	3	-246
3	2013/4/10	10:09:37	TEST	10	9	1	1	-376
4	2013/4/10	10:09:35	TEST	9	8	1	3	-250
5	2013/4/10	10:09:33	TEST	8	7	1	4	-376
6	2013/4/10	10:09:32	TEST	7	6	1	3	-251
7	2013/4/10	10:09:30	TEST	6	5	1	4	-373
8	2013/4/10	10:09:29	TEST	5	4	1	3	-251
9	2013/4/10	10:09:27	TEST	4	3	1	4	-376
10	2013/4/10	10:09:25	TEST	3	2	1	3	-257
11	2013/4/10	10:09:19	TEST	12	11	1	4	-375
12	2013/4/10	10:09:17	TEST	11	10	1	3	-250
13	2013/4/10	10:09:15	TEST	10	9	1	4	-376
14	2013/4/10	10:09:14	TEST	9	8	1	3	-250

Auto compensation of teaching point

OPTION

Used Function

- Gun teaching position compensation

Related document

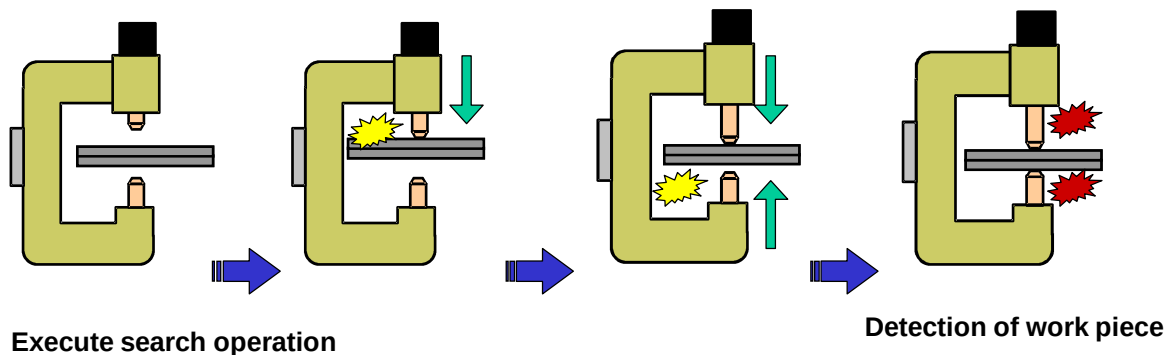
- DX200 OPTIONS INSTRUCTIONS FOR GUN TEACHING POSITION CORRECTION FUNCTION

Functional overview

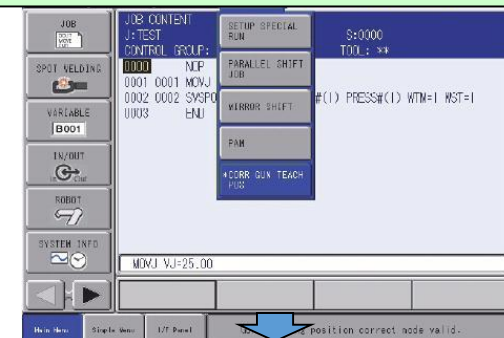
- This function automatically corrects SVSPOTMOV registered in the JOB. It can be used to automatically correct the misalignment of work pieces in the direction of Z axis of tool. It can be executed in teach or play mode.
- Correct up to 50 teaching points simultaneously

It automatically repeats teaching when there is a misalignment of work piece

Teaching time will be reduced significantly



Window showing result of compensation



Amount of compensation :
deviation of Tool-Z between
actual position & taught position

JOB NAME	LINE	DTCT	REV	CORR
TEST	2	0.34	0.00	0.34
TEST	3	0.19	0.00	0.19
TEST	4	0.34	0.00	0.34
TEST	5	0.19	0.00	0.19
TEST	6	0.19	0.00	0.19
TEST	7	0.35	0.00	0.35
TEST	8	0.31	0.00	0.31
TEST	9	0.33	0.00	0.33
TEST	10	0.34	0.00	0.34
TEST	11	-0.38	0.00	-0.38
TEST	12	0.34	0.00	0.34
TEST	13	0.18	0.00	0.18
TEST	14	0.21	0.00	0.21

CLEAR CANCEL

Gun teaching position correct mode valid.

Dealing with welding of multiple work pieces

OPTION

Used Function

- Multistep pressure function

Related document

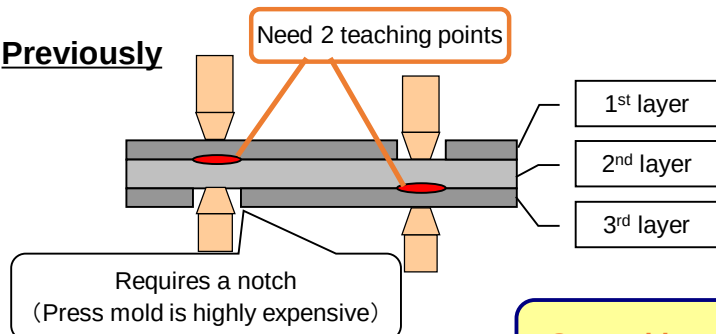
- DX200 OPTIONS INSTRUCTIONS FOR MULTISTEP PRESSURE FUNCTION

Functional overview

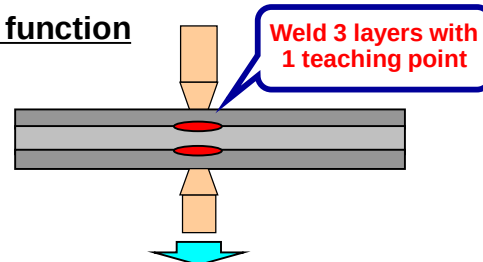
- The synchronization of pressure and current facilitates the creation of welding condition for 3 layer work pieces, or welding conditions that reduce sputter.

- Possible to weld 3 layers of thick work pieces
- Enables sputter less high welding quality

Previously



New function



Control by synchronizing pressure and welding current using welding completion signal

