

WIRE-EDM SYSTEMS

HA Series

OPERATION

Contents

CHAPTER 1	Basic Operations	1 ~ 11
CHAPTER 2	Machining Using the Basic Operation Screen	1 ~ 79
CHAPTER 3	Machining by Automatic Second Cutting	1 ~ 57
CHAPTER 4	Applied Operation	1 ~ 54
CHAPTER 5	Explanation of Machining Technology	1 ~ 7 - 7

CHAPTER 1. Basic Operations

Contents

1.	What is the basic operation screen?	1
2.	Outline of the mechanical system and control unit.....	2
3.	On the manual box	3
4	Operating procedure	4
4.1	Introduction	4
4.2	Procedure 1	5
4.3	Procedure 2	6
4.4	Data input	7
4.5	Settings	8
4.6	Graphic display	9
4.7	Monitor	10

CHAPTER 2. Machining Using the Basic Operation Screen

Contents

1.	How to stretch the wire	1
1.1	Initial setting of wire electrodes	1
1.2	When using an automatic wire feeder	3
1.2-1	Setting the wire in the automatic wire feeder	3
1.2-2	Automatic wire insertion method	6
1.3	Case in which an automatic wire feed is not used	9
2.	Adjusting wire verticality	10
2.1	Setting wire alignment device	10
2.2	How to adjust verticality	11
3.	Adjusting taper specifications	12
3.1	Input blade height, plate thickness and guide span	12
3.2	Setting of specifications for taper machining	13
3.2.1	Program dimensions (Z_1)	13
3.2.2	Setting of feed speed height (Z_2)	14
3.2.3	Setting of upper guide span (Z_3)	15
3.2.4	Setting of lower guide span (Z_4)	15
3.2.5	Arbitrary shape height specification (Z_5)	16
3.3	Adjustment of taper specifications	17
4.	Workpiece setting and positioning	19
4.1	Workpiece setting and parallel adjustment	19
4.2	Positioning	20
4.2.1	Automatic center positioning	20
4.2.2	Automatic edge surface positioning	21

5.	Upper nozzle and dielectric fluid flow rate adjustment	22
5.1	How to set the upper head position during machining	22
5.2	How to adjust the machining fluid flow rate	23
6.	Data input	24
6.1	When inputting from a 3.5-inch floppy disc (MFD)	24
6.2	Case of input from tape reader	25
7.	Settings	26
7.1	Selection of operation mode	26
7.2	Setting data needed for machining	27
7.3	Mirror image and axis exchange functions	31
8.	Program check	32
8.1	How to perform a program check	32
9.	Program search	34
9.1	Selection of program mode and program search	34
10.	Check the machining status	36
10.1	Machining shape	36
10.2	Machining speed	37
10.3	Offset	37
10.4	Taper angle	38
10.5	Coordinate values	38
10.6	Machining conditions	39

11.	Applications	40
11.1	How to use the automatic wire feeder	40
11.1.1	Program basics	40
11.1.2	Program example	41
11.1.3	Machining procedure	42
11.2	How to use the subprogram function	43
11.2.1	Creation of subprograms	43
11.2.2	Calling a subprogram	43
11.2.3	Program example	44
11.3	Examples of using expanded automatic wire feeder function	47
11.3.1	How to use the "Expansion A.W.F. function"	47
11.3.2	Die shape cut skipping and cut machining with a single numerical control program	49
11.3.3	Case in which restart after wire breakage is difficult	50
11.3.4	Case in which there is possibility that wire will break frequently	52
11.3.5	Case in which some cutting is skipped during machining of many workpieces simultaneously	53
11.3.6	Case in which start hole is 1.5mm or less in diameter	55
11.3.7	Case in which it is possible that the Z axis will hit something during restart after wire breakage	56
11.3.8	"Expansion A.W.F. functions" data setting by numerical control program	57

11.4	Taper machining	58
11.4.1	Basics of taper machining	58
11.5	Examples of many machining pieces on workpieces	65
11.5.1	Sample programs	65
11.5.2	Machining procedure	73
11.6	Example of expanded machining	75
11.6.1	Sample program	76

CHAPTER 3. Machining by Automatic Second Cutting

Contents

1.	How to create a numerical control program for automatic second cutting	1
1.1	Precautions	1
1.2	Sample programs	2
2.	Data input.....	16
2.1	Registration from MFD	16
2.2	Case of input from tape reader	17
3.	Parameter settings	18
3.1	Explanation of input parameters	18
3.1.1	Basic element parameters.....	18
3.1.2	Machining procedure parameters	23
3.2	How to input parameters	25
3.3	Operation examples	27
4.	Automatic second cut program check	41
5.	Program search	42
5.1	Operation mode selection and program search	42
6.	Check of machining status	43

7.	Machining applications	44
7.1	Use together with automatic wire feeder (*)	44
7.1.1	Sample program — multiple die shapes	44
7.1.2	Example of operation	46
7.2	How to use automatic second cutting together with automatic wire feeder and expanded A.W.F. functions	49
7.3	How to input and output automatic second cut variables	54
7.3.1	How to input automatic second cut variables	54
7.3.2	How to output automatic second cut variables	56

CHAPTER 4. Applied Operation

Contents

1.	Precautions in using the automatic wire feeder	1
1.1	Changing the wire diameter	1
1.1.1	Upper diamond die replacement	2
1.1.2	How to replace the lower diamond die	5
1.1.3	Cleaning and replacement of the diamond dies and the electrical power feed die	6
1.1.4	Jet liquid pressure setting	7
1.1.5	Collection roller spring pressure adjustment	8
1.1.6	How to install and remove guide pipes (A) and (B)	9
1.2	Automatic fine hole insertion	12
1.3	Precautions when using an 0.1mm diameter wire	14
2.	Applied operation in positioning	16
2.1	Workpiece tilt correction	16
2.2	Automatic positioning	17
2.3	Inclined end surface positioning	20
3.	Numerical control program and E pack editing functions	24
3.1	Memory editing functions	24
3.2	Numerical control program erasure	28
3.3	E pack	30

4.	Auxiliary functions	33
4.1	Optional stop (M01)	34
4.2	Block delete	35
4.3	Coordinate rotation settings	35
4.4	Setting of figure magnification S	38
4.5	Each axis magnification settings	40
5.	How to check the program on the actual machine	42
5.1	Figure check	42
5.2	Dry run	45
6.	Action to take when power failure occurs	46
6.1	Action to take when power failure occurs	46
7.	Workpiece offset	49
7.1	Workpiece offset	49
8.	Numerical control program commands	52
8.1	Setting parity V	52
8.2	0.1 μ m command method	53
8.3	How to use inch commands	54

5. Setting machining conditions

Contents

1. Setting machining conditions	
1.1 Names of notches	1-1
1.2 Setting of each notch	1-3
1.3 Setting of E pack, offset amount, machining speed (FA)	1-7
2. Setting machining conditions for different types of wire electrodes	
2.1 Wire electrode materials	2-2
2.2 Wire electrode selection	2-3
2.3 Setting notches and wire tension	2-5
2.4 Setting machining conditions for different wire electrode diameters	2-6
2.5 Estimating machining time for each wire electrode coil	2-8
3. Setting machining conditions for different types of workpieces	
3.1 Machining condition settings for different workpieces	3-2
3.2 Setting notches and dielectric fluid specific resistance	3-4
4. Increasing machining speed and preventing wire breakage	
4.1 Precautions in high speed machining	4-2
4.2 Setting machining conditions for steps and taper machining	4-4
4.3 How to apply water when starting machining from an end surface	4-7
4.4 Avoiding wire breakage in case of trouble	4-8
5. Increasing machining precisions	
5.1 Test machining	5-2
5.2 Number of machining operations as related to surface roughness and dimensional accuracy	5-3
5.3 Adjusting the machining fluid flow rate in second cutting	5-4
5.4 Adjusting machining conditions in second cutting	5-6
5.5 Effect of machining distortion on precision	5-8
5.6 Heat treatment of workpiece materials for use in wire electrical discharge machine	5-9
5.7 Machining distortion in wire electrical discharge machine	5-10
6. How to repeat machining manually in case of wire breakage	
6.1 Manual rewiring	6-2
6.2 Repeating machining manually	6-5

HA Series ---

7. Related technology

7.1	Tools and jigs	7-2
7.2	Preventing splashing of dielectric fluid	7-4
7.3	How to use rust preventive machining fluid and adjustment fluid for Mitsubishi wire electrical discharge machine	7-7