

SEAM TRACKER

INSTRUCTION MANUAL

MODEL : HMG 01

HMG 02

HMG 03

HMG 05

HMG 10

HMG 20

HMG 40

1. SEAM TRACKER

It is a unit for tracking down the welding seam line with the precise probe sensor HP-03-L.

The deformation of work- piece is sensed and detected, and the deformed value is controlled in the controller HCN-14.

Therefore, it is possible to automatically correct the deformation on work-piece, which is occurred by itself and heating. The welding torch is guided rapidly and exactly by moving the slides up, down, right and left.

The seam tracker has a function to protect a deviation which happens when thin butt welding; the emergency stop function does work when the deviation is occurred, if any.(OPTION)

Our seam tracker can be applied to a welding system for automation and unmanned system. (OPTION)

In addition, as the seam tracking is precise and the unit is controlled by program, our seam tracker can produce the better welding products.

2. STANDARD SPECIFICATION

2-1 SEAMTRACKER

1) MODEL : HMG - 01 ~ 03

FROM		HMG - 01	HMG - 02	HMG - 03
SPEC				
LOADED WEIGHT		5kgf	10kgf	15kgf
SLIDE		HS-01-100	HS-02-140	HS-03-100
SLIDE WEIGHT		3.6kg	6kg	8kg
SLIDE STROKE		X, Y EACH 100mm	X, Y EACH 140mm	X,Y EACH 100 mm
SLIDE SPEED		100mm/min	150mm/min	150mm/min
ACCURACY		± 0.125mm	± 0.125mm	± 0.125mm
ALLOWANCE MOMENT		70kg-cm	180kg-cm	300kg-cm
METHOD OF WELDING TO APPLY		GTAW	GTAW	GTAW, GMAW
MOTOR FOR RUNNING	STEPPING MOTOR			
DRIVING METHOD	MOTOR DRIVE → REDUCER → BALL SCREW → SEAM TRACKING			
FUNCTION OF CONTROL	MANUALL	UP, DOWN, LEFT, AND RIGHT MOVEMENT, PULL-UP MOVEMENT		
	AUTOMARIC	RIGHT/BOTH/LEFT, PULL-UP, REMOTE CONTROL FUNCTION, OK-OUT DETECTION, EM-OUT, FORCED DIFFERENCE, FORCED STOP FUNCTION OF THE DETECTION, REVERSE FUNCTION LEFT/ RIGHT, TACK DETECTION(OPTION), END-DETECTION 1, 2(OPTION), TORCH IS COMPULSORILY TRACKED OUT(OPTION)		
ELECTRIC POWER	AC110/220V,1 Ø, 60Hz, 2A			
OPTION	REMOTE CONTROL (HRC-1), TORCH ADJUST(HTA-05,10), TORCH LIFTER(HUD-05), TWIN LIFTER(HWUD-05) M/C OUT CONNECTOR, REMOTE CONNECTOR, TACK WELD SENSING FUNCTION, SENSOR FORCED SEPARATE FUNCTION END-PART(I) SENSING FUNCTION, END-PART(II) SENSING FUNCTION			

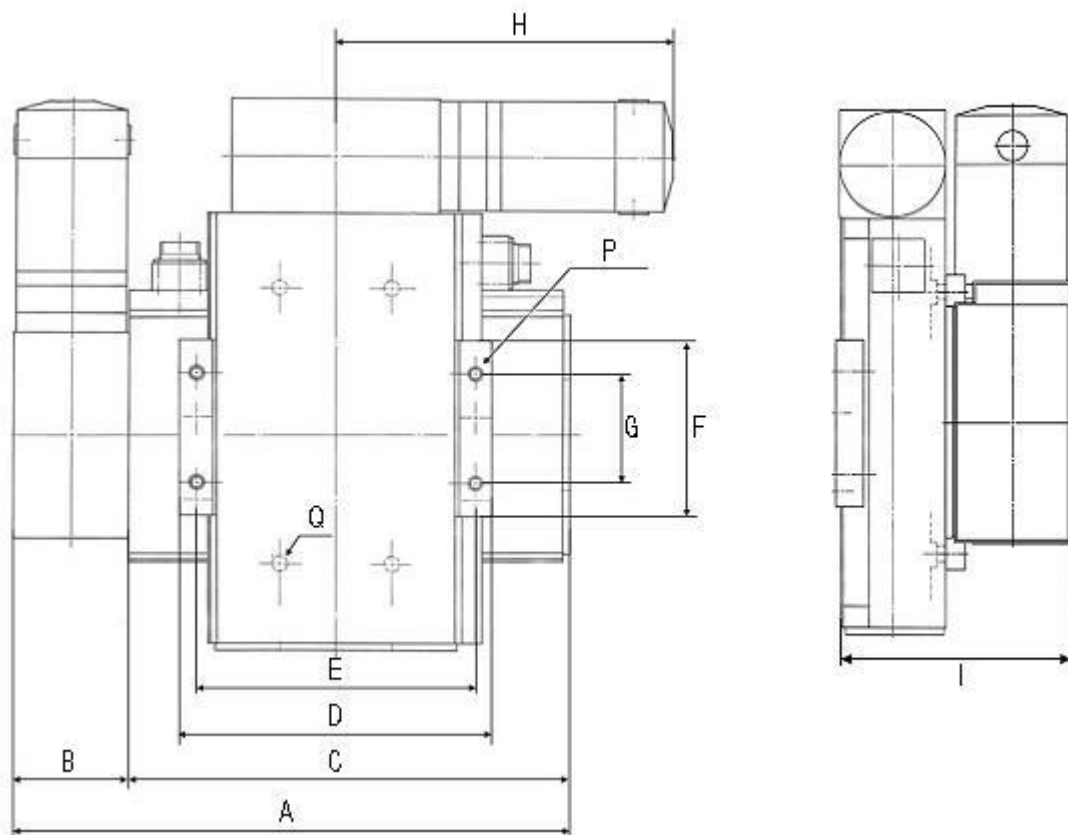
2) MODEL : HMG - 05~ 20

FROM		HMG - 05	HMG - 10	HMG - 20	HMG - 40
SPEC					
LOADED WEIGHT		25kgf	50kgf	100kgf	200kgf
SLIDE		HS-05-100	HS-10-200	HS-20-200	HS-40-200
SLIDE WEIGHT		12kg	22kg	48kg	50kg
SLIDE STROKE		X,Y EACH 100mm	X,Y EACH 200mm	X,Y EACH 200mm	X,Y EACH 200mm
SLIDE SPEED		250mm/min	250mm/min	170mm/min	145mm/min
ACCURACY		± 0.25mm	± 0.25mm	± 0.35mm	± 0.5mm
ALLOWANCE MOMENT		700Kg-cm	1,400Kg-cm	3,700Kg-cm	8,500Kg-cm
METHOD OF WELDING TO APPLY		GMAW	SUBMERGED	SUBMERGED TANDEM	SUBMERGED TANDEM
MOTOR FOR RUNNING	DC PRECISION MOTOR				
DRIVING METHOD	MOTOR DRIVE → REDUCER → BALL SCREW → SEAM TRACKING				
FUNCTION OF CONTROL	MANUALL	UP, DOWN, LEFT, AND RIGHT MOVEMENT, PULL-UP MOVEMENT			
	AUTOMARIC	RIGHT/BOTH/LEFT, PULL-UP, REMOTE CONTROL FUNCTION, OK-OUT DETECTION, EM-OUT, FORCED DIFFERENCE, FORCED STOP FUNCTION OF THE DETECTION, REVERSE FUNCTION LEFT/ RIGHT, TACK DETECTION(OPTION), END-DETECTION 1, 2(OPTION), TORCH IS COMPULSORILY TRACKED OUT(OPTION)			
ELECTRIC POWER	AC110/220V,1 Ø , 60Hz, 2A				
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2-2 SLIDE UNIT

MODEL	LOADING CAPACITY	STROKE	SPEED	MOMENT	WEIGHT
HS01-100	5kgf	100mm	100mm/min	70kg-cm	3.6Kg
HS02-140	10kgf	140mm	150mm/min	180kg-cm	5.4Kg
HS03-100	15kgf	100mm	150mm/min	300kg-cm	8Kg
HS05-100	25Kgf	100mm	250mm/min	700Kg-cm	12Kg
HS10-200	50Kgf	200mm	250mm/min	1,400Kg-cm	18Kg
HS20-200	100Kgf	200mm	170mm/min	3,700Kg-cm	29Kg
HS40-200	200Kgf	200mm	145mm/min	8,500Kg-cm	30Kg

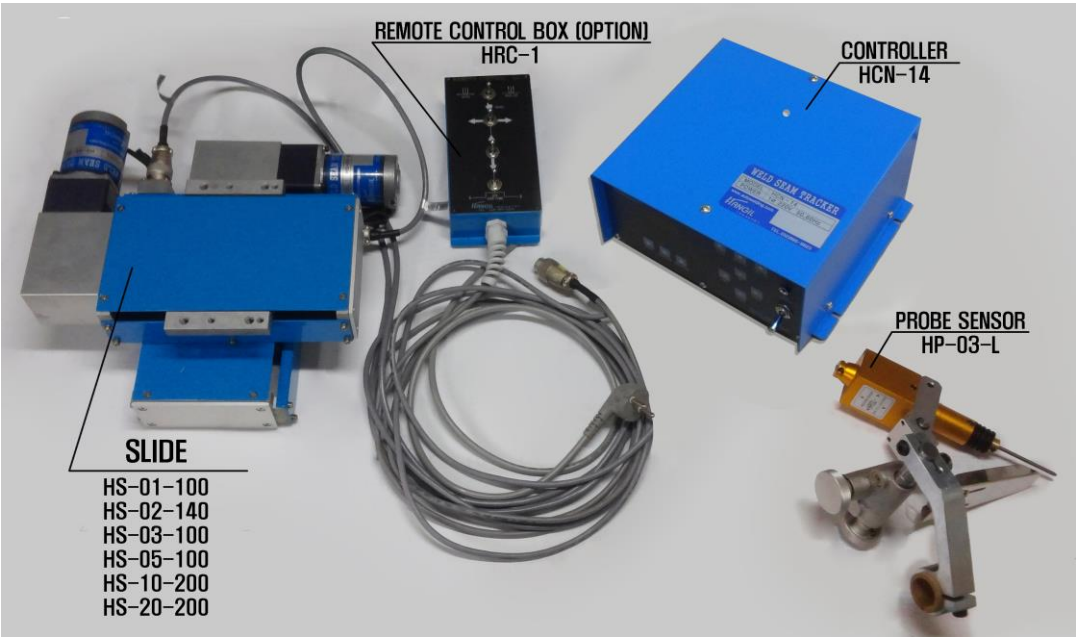
MODEL	A	B	C	D	E	F	G	H	I	P	Q
HS01-100	206	34	172	84	72	34	22		88	4-Ø 5.5DR	4-M5 TAP
HS02-140	278	40	238	104	90	58	34		104	4-Ø 6.5DR	4-M6 TAP
HS03-100	249	46	200	127	112	60	48		100	4-Ø 6.5DR	4-M6 TAP
HS05-100	310	72	238	168	150	96	60	182	124	4-Ø 9DR	4-M8 TAP
HS10-200	446	72	374	200	180	126	76	188	144	4-Ø 11DR	4-M10 TAP
HS20-200	531	87	444	234	210	192	164	199	170	4-Ø 11DR	4-M10 TAP
HS40-200	559	99	460	238	212	190	164	269	184	4-Ø 14DR	6-M12 TAP



3. STRUCTURE

3-1 STRUCTURE PRODUCT

1) CONTROL BOX -----	Electric Power Cable 1.5M × 1
2) X,Y SLIDE -----	Connection Cable 2M × 2
3) PROBE SENSOR -----	1
4) SENSOR ADJUST -----	1
5) REMOTE CONTROL BOX(OPTION) -----	1



4. EXPLANATION FOR THE PARTS

4-1 CONTROL BOX

It arranges the sensing signal from sensor and then put the suitable signals out such as up/down/left/right.

4-2 X, Y SLIDE

The X,Y sliders do move up, down, right and left according to the probe sensing and program. The slider has a DC motor and ball screw for the fine moving and precise operation. In addition, the stroke limit switch is used for protection of the slider and motor.

*X SLIDE (UP-DOWN SLIDE) : MOVE FROM UP TO DOWN

*Y SLIDE (LEFT-RIGHT SLIDE) : MOVE FROM LEFT TO RIGHT

4-3 PROBE SENSOR

It is a touch sensor, checking the condition on the welding seam line and transmitting the detected welding position to CONTROL UNIT.

4-4 SENSOR ADJUST

- A device which can move the SENSOR finely to up, down, left and right. RH/LH is manufactured symmetrically according to the direction of installment.
- The torch is moved to the opposite direction if the user works on SENSOR ADJUST, as zero point is determined on the basis of SENSOR.

4-5 CONNECTOR FOR OUTER CONNECTION(OPTION)

- 1) CN 1 : CONNECTOR FOR CONNECTION OF CONTROLLED OUTPUT OF OUTER MACHINE(M/C)
- 2) CN 2 : CONNECTOR FOR REMOTE CONTROL BOX CONNECTION
- 3) CN 3 : CONNECTOR FOR LEFT-SLIDE & RIGHT-SLIDE
- 4) CN 4 : CONNECTOR FOR UP-SLIDE & DOWN-SLIDE
- 5) CN 5 : CONNECTOR FOR DETECTING SENSOR CONNECTION

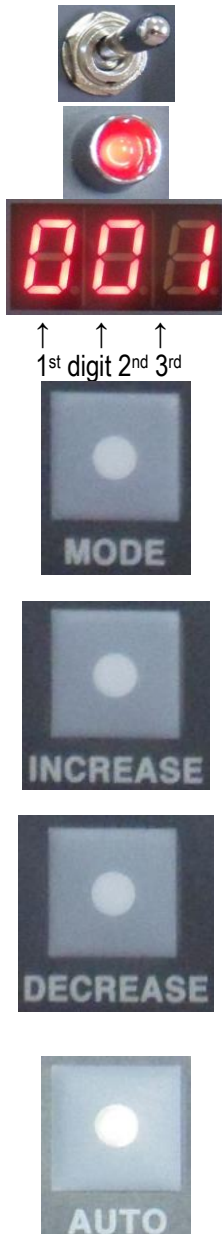
4-6 REMOTE CONTROL BOX(OPTION)

- This is a portable operating manual controller from CONTROL UNIT.

5. CONTROL DISPLAY



5-1 CONTROL(HCN-14)



1) POWER ON-OFF SWITCH

- Whenever you want to operate the seam tracker, switch on.
- Whenever you finish the operation, be sure to switch off.

2) ELECTRIC POWER DISPLAY LAMP

- When the power is supplied, the lamp is on.

3) TIMER & FUNCTION PROGRAM DISPLAY

- It is a displayer for TIMER setting and for function.
- Please refer to chapter 6. TIMER SETTING TABLE described below.

4) TIMER SETTING PUSH BUTTON

① "MODE" PUSH BUTTON

- It is located at the left. Whenever it is a push; on and off, the 1st digit is changed on the display; 0XX, 1XX, 2XX, 3XX, 4XX, 5XX, 6XX, 7XX.

② "INCREASE" PUSH BUTTON

- If you want to increase the data(xx), you should keep push on both INCREASE button and "MODE" button until the data you want shows up on the display. When the target data shows up on the display, push off the INCREASE button. Examples) For the data(xx), the figure is to be gradually increased up to 100 ~199. When the digit that you want, shows up on the display, you should touch off the INCREASE(OR DECREASE) button. Then the digit is automatically saved.

③ "DECREASE" PUSH BUTTON

- This button can be used for decrease of the digit of data. Please keep push on "MODE" button and then give one push on the "DECREASE" button. The one push makes the digit down. For the further information, please refer to the "function setting table" described below.

6) SWITCH FOR TURNING TO AUTO, MANUAL & PULL-UP

① "AUTO" POSITION

- In this position, the PROBE SENSOR makes automatically detection & control of the followings;
 - Move up/down, right/left
 - Tack welding part (OPTION)
 - The end part 1.2 of work-piece (OPTION)

- Deviation from welding line (OPTION)
- Emergency stop - Initial start position - Wrong welding



② “MANUAL” POSITION

- In this position, you can control up, down, left, independently and simultaneously with “manual toggle switch.”

③ “PULL-UP” POSITION

- In “PULL-UP” position, the slides can move upside according the set direction.

7) CONNECTOR



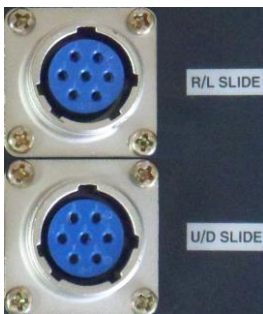
① M/C OUT Connector

- When to works at AUTO, it is a connector to output to other automatic equipments the detected signals such as initial position or emergency stop.
- Output signal is a type of relay contact.
- ※ Please refer to 7-4 in our manual (1) for further information.



② REMOTE Connector

- It is a Connector to remote-control the seam tracker working from other equipment's.
- Remote Control Box(HRC-1) is easy in operation (it is option when to order)
- It could be an automatic system if the seam tracker is connected to other automatic equipment.
- ※ Please refer to 7-4 in our manual (2) for further information.



③ R/L SLIDE Connector

- It is a connector for moving the slide from left to right or from right to left.

④ U/D SLIDE Connector

- It is a connector for moving the slide from down to up or from up to down.



⑤ SENSOR Connector

- It is a connector for connection of HCN-14 to the PROBE SENSOR(HP-03-L)



5-2 REMOTE CONTROL BOX(HRC-1)(OPTION)

This switch is for “AUTO” position, “Manual” Position and “Pull Up” Position)
 The S/W located at the left means “Auto” Position. The S/W at the center means “Manual” position. The right means “Pull Up” position.

① “AUTO” position

- In this position, the Probe Sensor can automatically detect and control the wrong welding because there are functions sensing the followings;
 - End part 1, 2 of work-piece(OPTION) · Tack welding part(OPTION)
 - Compulsory seam tracking out(OPTION)
 - Emergency stop · Moving of the slide to UP/DOWN/RIGHT/LEFT

② “MANUAL” position

- In this mode, you can manually control the slides to be moved to “UP, DOWN, LEFT AND RIGHT”. Please refer to the two switches showing the arrow mark : “LEFT and RIGHT” and “UP and Down”. Use this s/w for moving the slide to up/down and.

③ “PULL UP” position

- In this position, the sliders move up to the setting direction.

④ “END TIMER” ON-OFF SWITCH

- The switch works when the function “WORK END TIMER 2” is operated.
 Be sure that the s/w can work when the switch is on over the setting time.
 Therefore, the working stops when the switch gets “off” position during the operation.

6. TIMER SETTING TABLE

- There are three digits shown on the display.

The 1st digit, as TIMER, on the display is input from 0 ~ 7 by pushing the "SELECTION" on/off.

The 2nd and 3rd in TIMER 0 means the function

The input function is from 00 to 11. For more information, please refer to chapter "6-1 function setting and timer setting" described below.

The 2nd and 3rd in TIMER 1 to 7 means time or sec.

The input range is from 0.1 sec. to 9.9sec. The control range is 0.1 sec unit.

Des.	FUCNTION *please refer to chapter 6-1 function Setting	PULL - UP	SENSOR- RESPONDING - SPEED -ADJUST function	Tack Welding Sensing Function (OPTION)	SENSOR- Forced- Separate function (OPTION)	End-part 1 SENSING function Function (OPTION)	End-part 2 SENSING Function Function (OPTION)	Deviation length control function
TIMER	0	1	2	3	4	5	6	7
Input range	000 ~ 011	100 ~ 199	200 ~ 299	300 ~ 399	400 ~ 499	500 ~ 599	600 ~ 699	700 ~ 799

- For the TIMER setting, push on the "mode" button for the selection of the TIMER from 0 to 7. The data in the TIMER can be set or input with "increase" button or "decrease" by pushing.
 - How to increase the data in TIMER
 - After the mode selection, the operator can input the data in the TIMER by pushing on "increase" button. The pushing makes increase the figure. The consecutive pushing will increase the figures.
 - Do the same as the data increase, for decrease of the data in the TIMER.
- One-time push means 0.1 sec increase or decrease. The data setting is finished by pushing off and the new data is saved.

Examples

Function	TIMER = 0	SCALE 010 : RIGHT select., Reverse to right/left, Down first select.
PULL UP	TIMER = 1	SCALE 120 : 2.0sec.
Sensor-responding speed adjust	TIMER = 2	SCALE 201 : 0.1sec.
Tag welding sensing (OPTION)	TIMER = 3	SCALE 305 : 0.5sec.
Sensor-forced-Separate (OPTION)	TIMER = 4	SCALE 415 : 1.5sec.
End part detection 1 (OPTION)	TIMER = 5	SCALE 550 : 5.5sec.
End part detection 2 (OPTION)	TIMER = 6	SCALE 680 : 8.08sec.
Deviation distance control	TIMER = 7	SCALE 710 : 1.01sec.

6-1 FUNCTION SETTING AND TIMER SETTING (TIMER "0")

- FUNCTION SETTING TABLE -

TIMER No.	FUNCTION No.	Function Selection				Function Description
		left	right	Reverse to right/left	Down first	
0	00	x	x	x	x	BOTH
0	01	x	x	x	0	Slider down comes first
0	02	x	x	0	x	Reverse to right/left
0	03	x	x	0	0	Reverse to right/left & slider down priority
0	04	0	x	x	x	LEFT selection
0	05	0	x	x	0	While the slider for up/down goes down, left/right slider moves to LEFT side
0	06	0	x	0	x	LEFT selection, Reverse to right/left
0	07	0	x	0	0	LEFT selection, Reverse to left/right, Down priority function selection
0	08	x	0	x	x	RIGHT selection
0	09	x	0	x	0	RIGHT selection, down priority selection
0	10	x	0	0	x	RIGHT selection, Rev. to left/right selection
0	11	x	0	0	0	RIGHT selection, Reverse to left/right, Down priority function selection
0	12 ~ 15	12 ~ 15 : no function				

① Program lock and unlock

- Push on the "MODE" button for 10 sec, so the program is unlocked

② Function for unlock of the program or data

- Push on the "MODE" button for 10 sec, so the program is unlocked for change or correction of the program or data.

③ Check function for the lock or unlock of the program

- Check by pushing on the "MODE" button.

- Lock: the data or program is fixed
- Unlock: the data is displayed off.

④ Program input or change

- Unlock the MODE and go to the TIMER you want to input or change.

- By pushing on/off the "decrease or increase button", the new data in the TIMER can be input or changed.

◦ How to increase the data.

- For one-time pushing on "increase" button, the data increases 0.1sec

- Continue to push on until the new data you want reach and then off, the new data is automatically saved.

◦ How to decrease the data

- Do same with the "decrease" button as above remarked: How to increase

1) FUNCTION FOR TURING RIGHT, BOTH & LEFT (function select program refer)

- It is a function to select the direction of the torch when to start or to finish.

① RIGHT(when the function for the Y slide to take priority for the down movement is off,

TIMER "0" function selection "08")

- When you select RIGHT function and then position switch at AUTO, the slide moves to right side the minute that the slide goes downward. After the probe sensor(HP-03-L) does detect the welding line and stop moving, the sensor operates according the sensing condition.

② RIGHT(when the function for the Y slide to take priority for the down movement is on,

TIMER "0" function selection "09")

- When you select RIGHT and position switch at AUTO, the up-down SLIDE moves downward first and then the left-right SLIDE moves to the right. When PROBE detects it, SLIDE pauses and moves according to the condition for PROBE to detect.

③ LEFT(when the function for the Y slide to take priority for the down movement is off,

TIMER "0" function selection "04")

- When you select LEFT and position switch at AUTO, the up-down SLIDE moves at once downward and left. When DETECTION PROBE detects the left side, it pauses and moves according to the condition for the PROBE to detect.

④ LEFT(when the function for the Y slide to take priority for the down movement is on,

TIMER "0" function selection "05")

- When you select LEFT and position switch at AUTO, the up-down SLIDE moves downward at first and then the left-right SLIDE moves to the left. When the PROBE detects it, the SLIDE pauses and moves according to the condition for the PROBE to detect.

⑤ BOTH(TIMER "0", function selection "00")

- When you select AUTO and operate it, the Y SLIDE goes down first, and then moves up, down, left and right according to the condition for PROBE to detect.

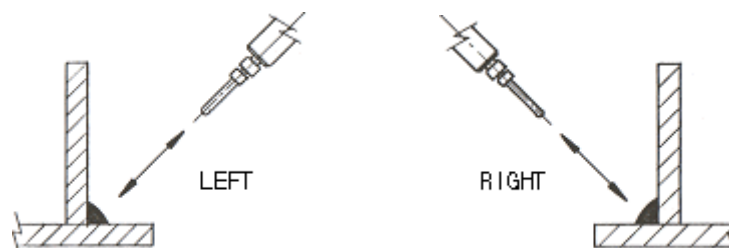
2) FUNCTION OF RIGHT, BOTH, LEFT, PULL UP

- You can use this function when you make X, Y SLIDE separated from the things to be weld.

① FUNCTION OF RIGHT/LEFT, PULL UP

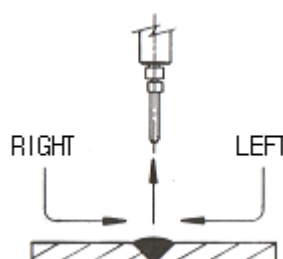
(TIMER "0", function selection "04, 05, 06, 07, 08, 09, 10, 11")

- First, select the function you want and then switch on the PULL-UP position, the X Y slides do move up at once to the selected direction : LEFT or RIGHT.



② FUNCTION OF BOTH, PULL UP(TIMER "0", function selection "00")

- Select this function and then switch on the PULL-UP position, the X Y slides do move up vertically.



3) SELECTION OF DOWNWARD MOVEMENT FIRST

(TIMER "0," function selection "01, 03, 05, 07, 09, 11")

- After the Y slide finishes moving downward at first, the X slide does move

4) FUNCTION OF RIGHT, BOTH, LEFT, AUTO

- It is a function to make X, Y SLIDE approach to the welding line according to the form of work-piece.

① FUNCTION OF RIGHT/LEFT, AUTO

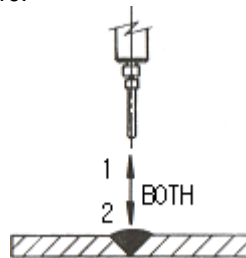
- Input the function you want and then switch on the PULL-UP position, the X Y slides do move like the picture.



In order to move the sensor from 1 to 2, please pick up the down priority function (TIMER 0, function selection : 05, 07, 09, 11) and the function for movement 3 should be off(45° move down, TIMER 0, function selection : 04,06,08,10). The movement 4 is pull-up.

② "BOTH, AUTO" FUNCTION (TIMER "0" function selection "01" = BOTH for down priority)

- Select the TIMER "0" and then pick up 00, 01, 02, 03 for BOTH functions. And then switch on "AUTO" position. So the slides do move like the following picture.



5) RIGHT, LEFT priority function (OPTION)

① FUNCTION FOR MOVEMENT OF RIGHT, LEFT, AUTO

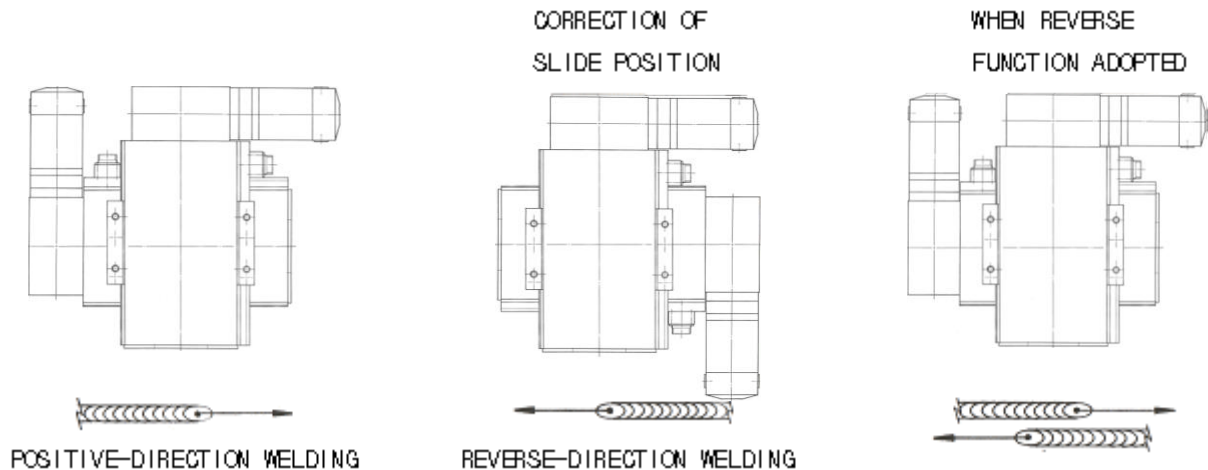
- It is the function to find out the welding start location in case that the seam tracker is used to attach an automatic welding system. In addition, it is needed to avoid the deviation of the sensor from the small fillet welding. In this function, the sensor works on the sensing condition after it takes decision on its initial position. First, input the TIMER 0 and the function you want, please take switch on AUTO position and then the X slide moves first to left or right according to the selected function.



6) REVERSE FUNCTION TO RIGHT, LEFT

(TIMER "0" function selection "02, 03, 06, 07, 10, 11)

- For the example, the seam tracker is installed to an automatic welding system, so you may use the function in case that the sensor and slides should be operated reversely for the RIGHT/LEFT side welding because the form of the work-piece. This function can be used for the case that the sensor should have stopped moving even though the sensor detects the work-piece ; the sensor continue to work on moving to left or right. Without this function, the X slide should be installed reversely.



6-2 PULL - UP TIMER(TIMER "1" = SCALE × 0.1sec)

- It is a function to control the pull-up time of SLIDES from work-piece after finish the welding.
- It means, for example, the SLIDES are pulled up for 2 sec only if 120 is programmed or set. The direction of SLIDES movement are fixed according to TIMER 0 and selected function: RIGHT, LEFT and UP. Input the TIMER 0 and the function you want, so the SLIDES go up for the input sec. as the selected function.

6-3 DETECTION(or RISING) TIMER(TIMER "2" = SCALE × 0.1sec)

- It is the TIMER for making the sensor-responding time longer, so the slides are forced not to do work on within the setting time. The sensor responding time should be adjusted longer according to the welding speed and the shape of the work-piece to be welded.

For example, there is a small spatter (size 1mm dia.) on the welding line on which the sensor goes. The sensor can detect the small spatter and then the slides do move according the sensing. The small spatter

* If the setting time is so far longer, the responding is too late to track down the welding line in the deformed work-piece.

* It is too shorter. The sensor responding signal is sensitively transmitted to the slides, so the welding has a bad bead resulted from the unnecessary responding.

6-4 TACK DETECTING TIMER (OPTION) (TIMER "3" = SCALE × 0.1sec.)

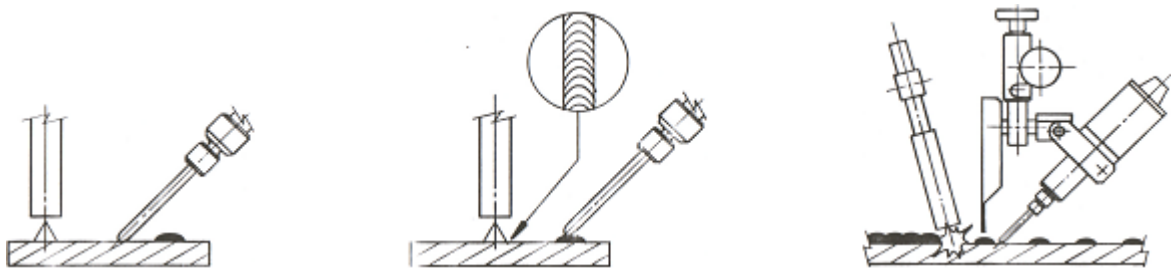
* The function works over 800mm/min. in the welding speed.

- The sensor probes the tack welding and the slides do not work within the setting time to be adjusted according to the welding speed and the size of tack welding.

- ① The sensor detects the tack welding and then the slides do not work within the setting time in the TIMER 3. After the set time is finished, the slides work on moving.
- ② The longer setting time may not detect the tack point.

EX) WELDING SPEED ----- 1,000mm/min
 TACK LENGTH ----- 20mm
 1,000mm/min ÷ 60sec ----- 16.6mm/sec
 TACK LENGTH 20mm = 1.2sec ≈ 2sec

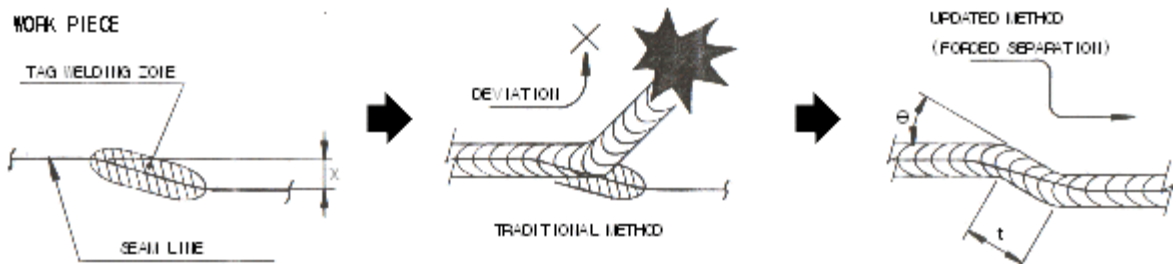
Based on the above, we will set 2 sec. however, we should set 3sec for better result.



6-5 CORRECTION TIMER(OPTION) (TIMER "4" = SCALE × 0.1sec.)

- During the lap welding, the tack welding produced after the tack welding TIMER operation may deviate the sensor. To prevent that, the left-right slide should be moved reverse to the setting program during the setting time.

- ① For the setting time longer, the welding may be missed. In other case, the sensor may be deviated.
- ② The user should adjust the setting time properly in consideration of the welding speed, tack welding size and the deformed work-piece.
- ④ It is proper for the user to set 0.1 – 0.4 sec. for the lap welding.



6-6 WORK END TIMER 1(OPTION) (T5 = SCALE × 0.1sec.)

- This function should be required when the remote control or the outside machine is connected. It is a function that the sensor can detect the end part of the work-piece automatically. The slide movement stops for setting sec while when the sensor senses the end part. All the functions stop after the setting time pass over. The setting time should be properly adjusted to the welding speed.

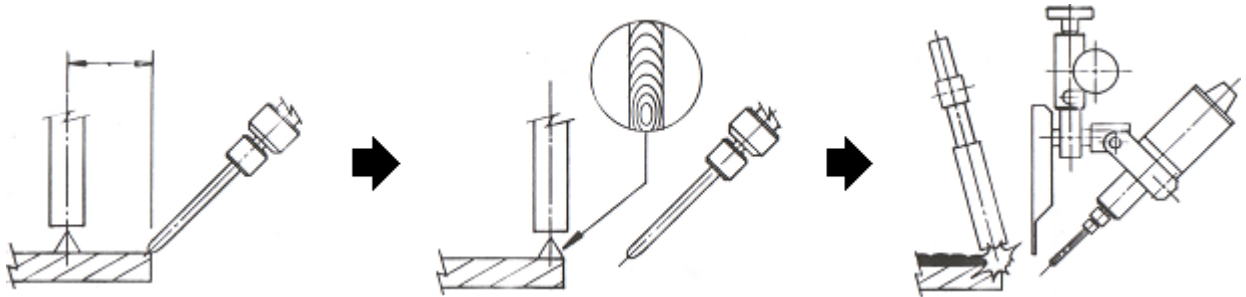
- ① The longer setting time makes the welding finished over the end-part.
- ② The shorter setting time does the welding finished before the end-part.
- ③ If the sensor detects the end, the slides stop moving for a while. After the setting time, all the moving is completed.

Ex.) The length between the torch and sensor is 50mm. The welding speed is 1000mm/min.

$$1000\text{mm/mn} \div 60\text{sec} = 16.6\text{mm/sec}$$

$$50 \div 16.6 = 3.0\text{sec} \times 0.8 = 2.4\text{sec.}$$

It is better to apply 80% of the calculated time to the setting time, because the welding is finished Just before the end part.



6-7 WORK END TIMER 2(OPTION) (T6 = scale × 0.1sec.)

- The end-user will recognize the difference between the work end timer 1 and 2. When you use the sensor for the work end timer, you should use this function. It is a function to stop working after being welded to some distance or to the end part in the straight Welding and in addition, the function can prevent the deviation of the sensor and the welding defect occurred to be folded in case of the orbital welding.

- In order to use the function, the user should arrange the welding speed and the stop distance in advance and then switch on.

- ① To use this function, you have to use the external switch "on or off" like the remote control. During the setting time the slides will stop and after then they will work.
- ② If the switch is off during the TIMER operation, the setting function will not work invalid.
- ③ The slides do stop working until the setting time is over.

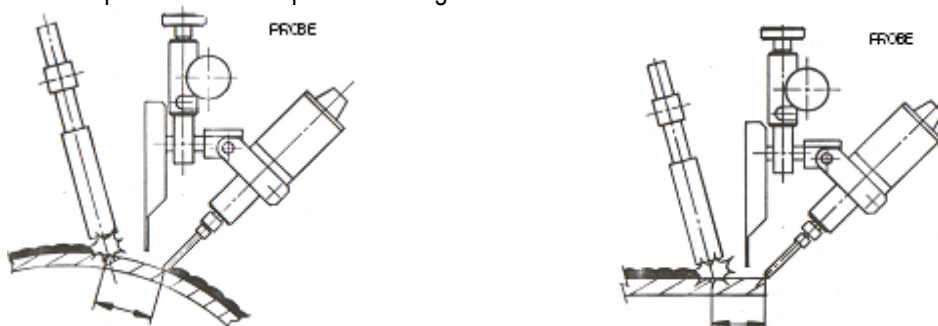
Ex.) Welding speed = 1000mm/min.

Stop distance = 100mm

$$1000 \div 60 = 16.6\text{mm/sec}$$

$$100 \div 16.6 = 6.02\text{sec} \approx 6.0\text{sec}$$

6.0 sec should be input in order to stop after welding 100mm from "switch on"



6-8 DEVIATION DISTANCE CONTROL TIMER (T7 = scale × 0.1sec.)

- It is the TIMER to stop moving slides so as to prevent the poor welding and the deviation occurred during the lap or butt welding. They will work during the setting time and after that they stop working if the setting time passed: the output signal for the completion of the detection of initial position is "off" and the emergency stop is "on".

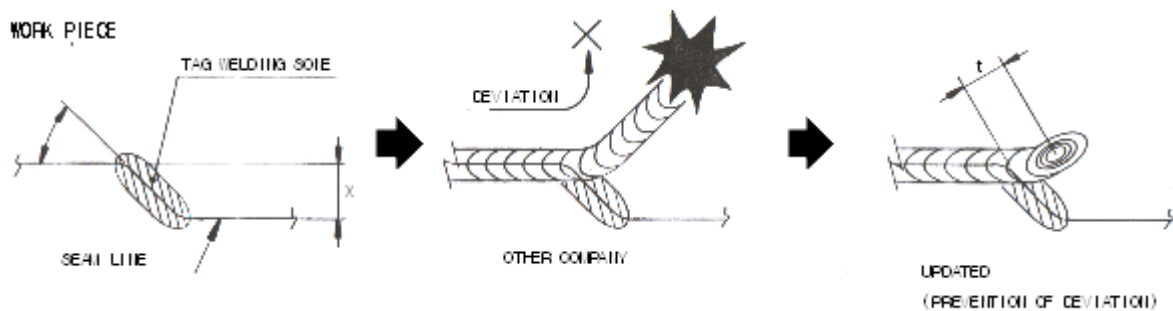
- ① The time should be set in consideration of the max. rate of deformation in the work-piece.
- ② The shorter setting timer makes the wrong signal transmitted. Even though the slides work properly in the deformation zone, the controller may get the signal for the derail.

Ex.) Max. rate of deformation : 10mm

Slide Speed : 250mm/min.
 $250\text{mm/min} \div 60\text{sec} = 4.16\text{mm/sec}$

$10\text{mm} \div 4.16\text{mm/sec} = 2.40\text{sec} \approx 3.0\text{sec}$

It takes 2.4sec for the slide to respond by sensing the max. rate of deformation, so the proper time should be 3.0sec in order to avoid the derail. Please input the longer time.



6-9 OTHER FUNCTION- CONTROLLER (HCN-14)

1) SELF-CHECK function

- If there is some error in CPU and program, the following message shows up according to the self-check function.

TIMER No.	Displayed figure	REMARK
0	015	CAUSE: E/P ROM is not initialized. The input voltage and power is down (when both is down until 10%) The self-check function works and after checking the cause, the program is unlocked and push at once on SELEC button and INCREASE button for initialization "00" Input the data again.
1	122	
2	222	
3	322	
4	422	
5	522	
6	622	
7	722	

2) UNLIMITED TIMER DATA

- The TIMER 1-7 has the following meaning for the data 00, except for the TIMER "0".

TIMER No.	DATA 00	Description
0	000	Function selection is BOTH
1	100	process is unlimited
2	200	Non-processed data
3 ~ 6	300, 400, 500, 600	Non-processed data
7	700	Process is unlimited

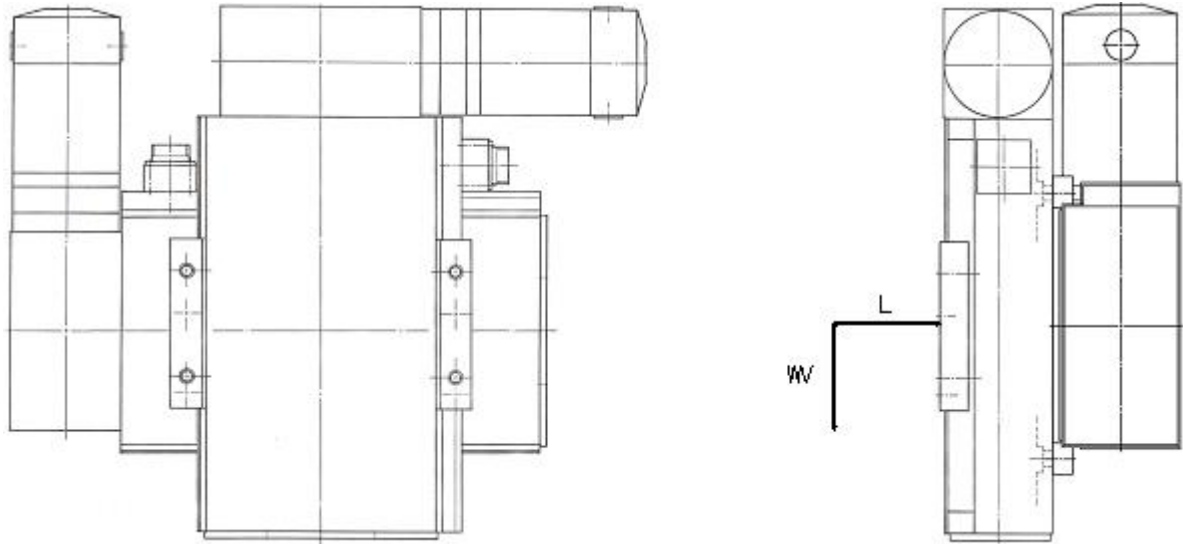
- EX) ① If the TIMER 1 is input as data 00, the slides moves until the limit switch works. It is better to use this function as SLIDER HOME.
- ② If the TIMER "7" data is input as 00, the slides is processed until the limit works. Please use data as 00, except for lap welding.

7. HOW TO INSTALL

7-1 SLIDE

1) Check the loading capacity.

- Please refer to the following picture and then set how many kg you can be loaded for the cross slide.
First, please check the allowable capacity in chapter 2-2.



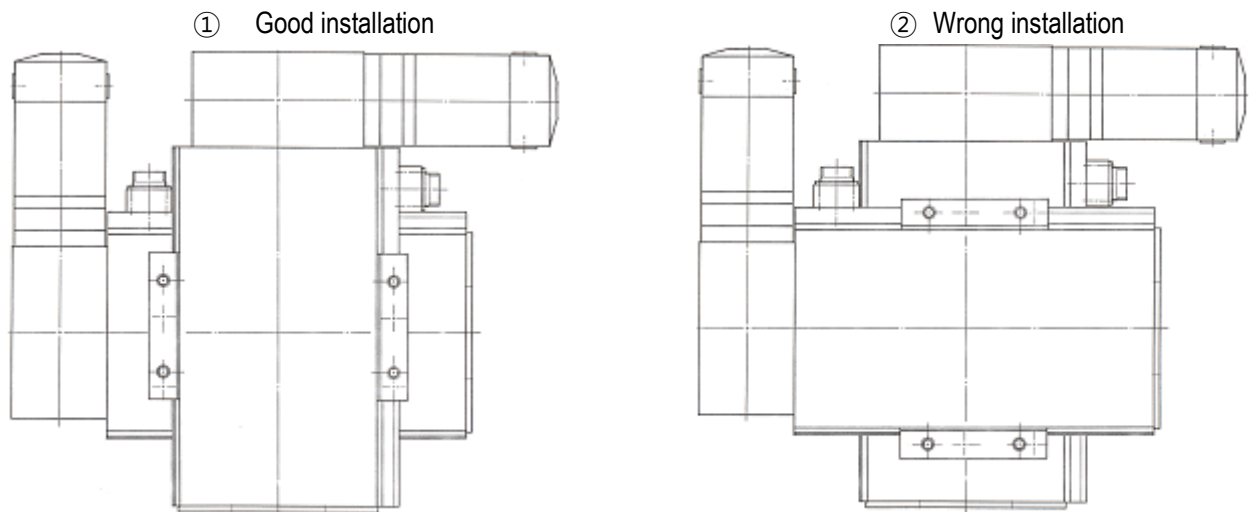
WV = vertical loading capacity (kg)

L = length from the surface : 100mm

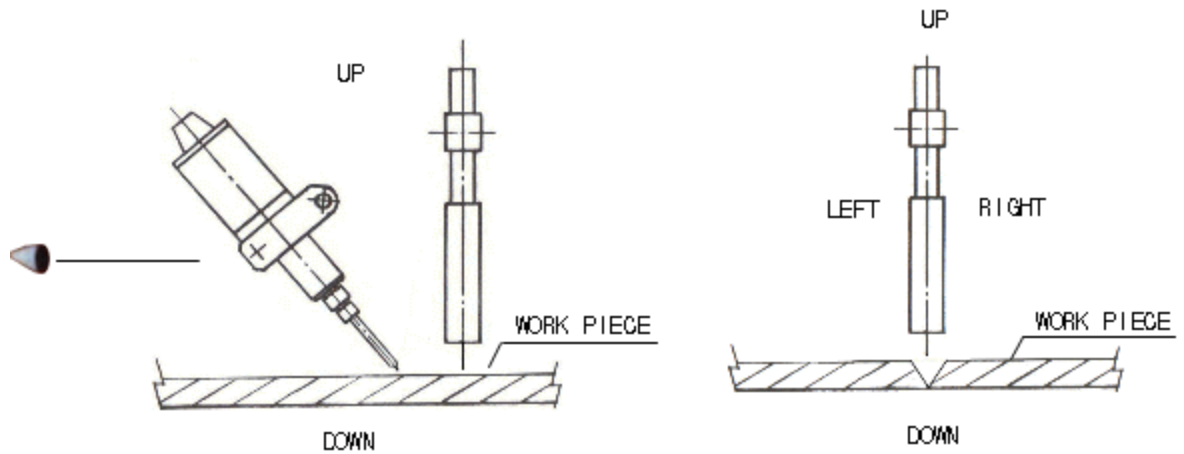
The max. loading capacity for model No. HMG-05-100 is 25kg from 100mm. Therefore if you install the length longer than 100mm, you should reduce the loading capacity. (Note : please note don't load over the capacity.)

2) Standard Installation

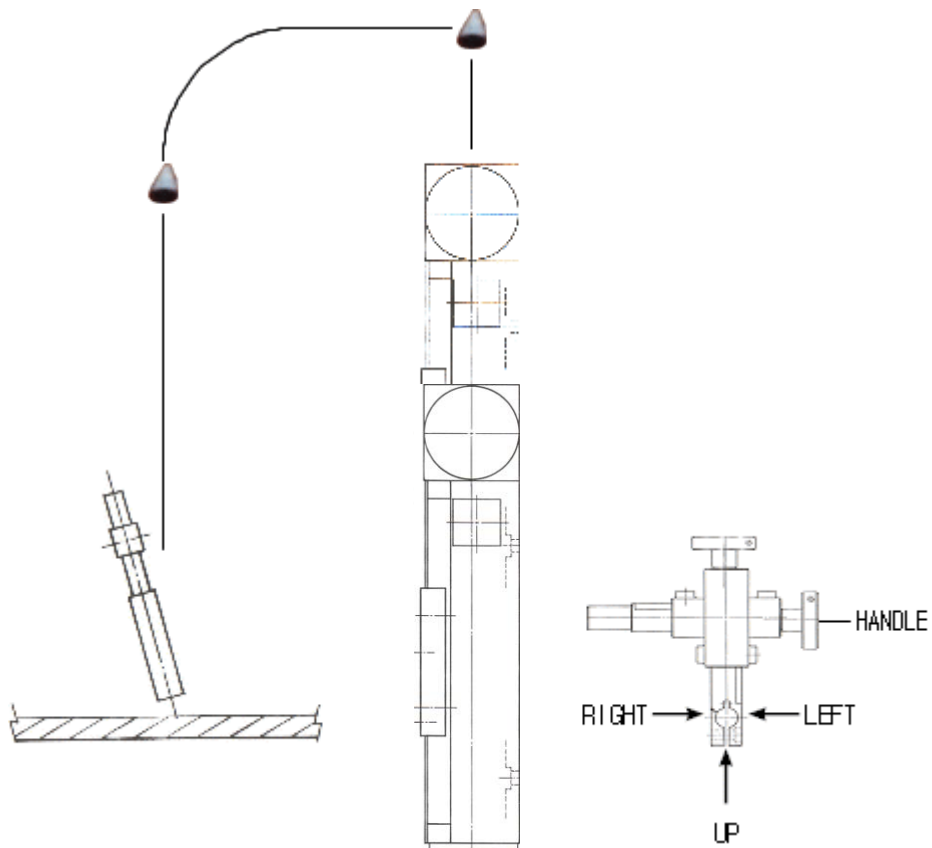
- The up-down slide and left-right slide are installed as the picture.



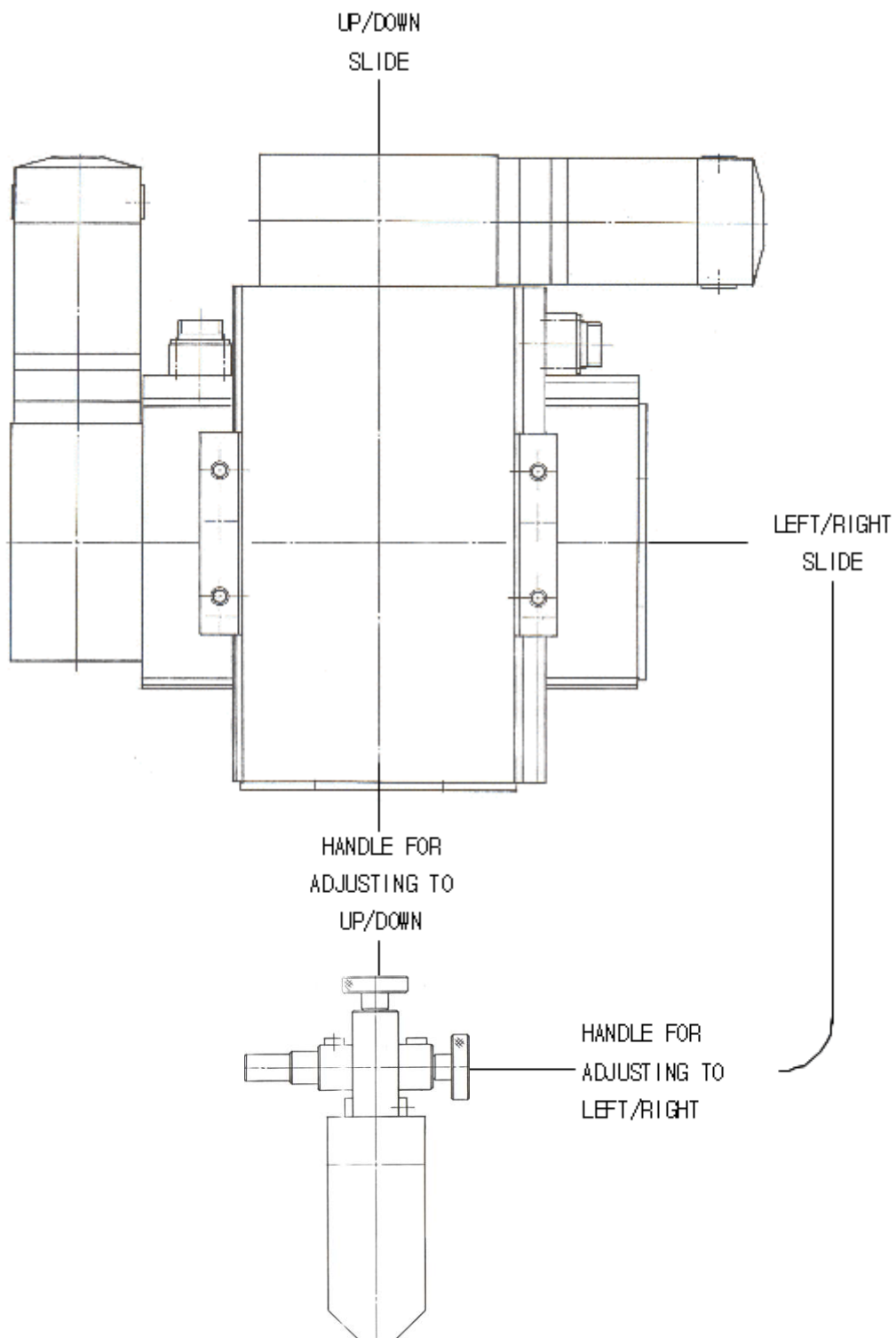
- ① is the example of the standard installation.
- ② is wrong installation. The loading capacity is reduced to a third in this case.
- ① The up, down, left and right mean the direction when the user takes look from the welding process direction.



- ② The up-down slide is called as Y axis. The up means the torch moves upside and the down means the torch approaches to the work-piece.
- ③ The left-right slide is called as X axis. The left means the torch moves left side when the user takes look from the welding process direction. For the right, the torch moves right side.



3) INSTALLATION

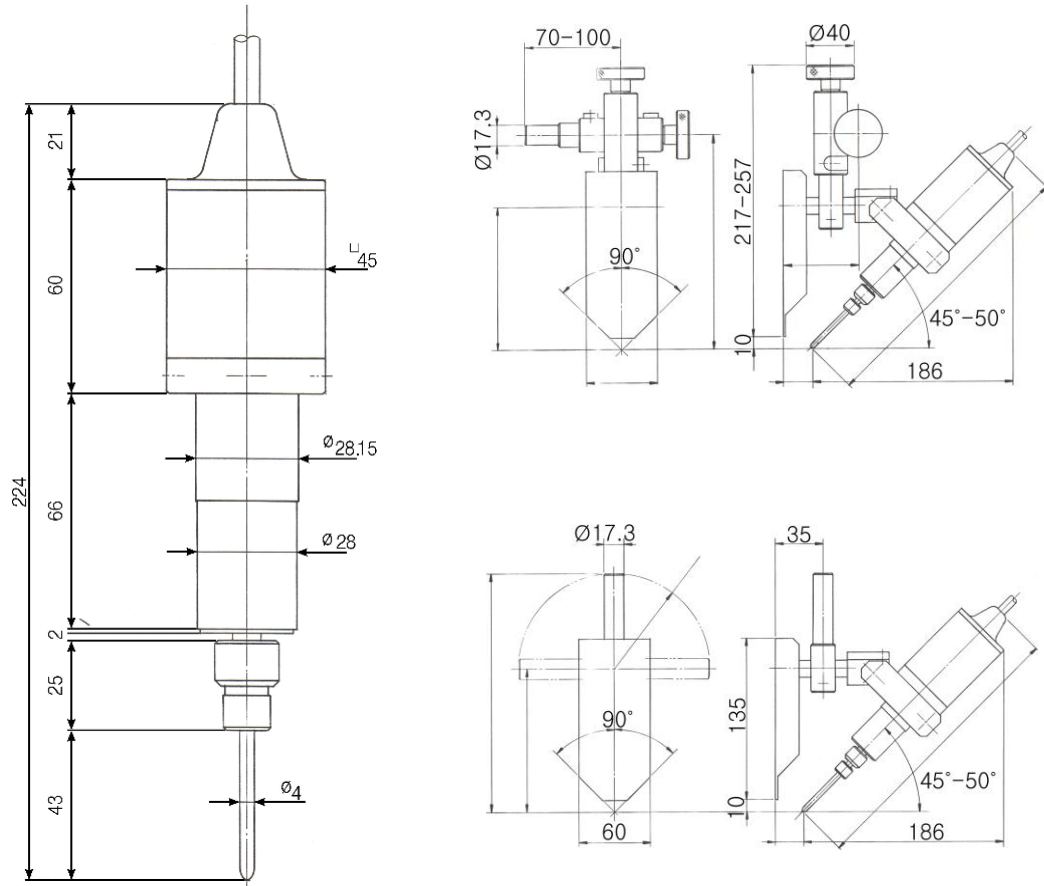


- Please install the slides by referring to the above picture and the sensor should be attached as the Above picture. The power and cable should be connected after fully understand the electric drawing.

7-2 PROBE SENSOR

1) Installation Angle

- The SENSOR should be installed as 45° standard. The allowance is within $\pm 5^\circ$. If the allowance is over, the sensor may be operated abnormal. Please refer to the following picture when you install the sensor.

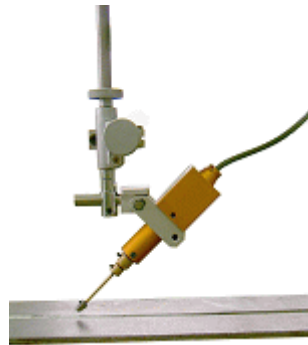


① BOTH

Front



Side



② RIGHT

Front

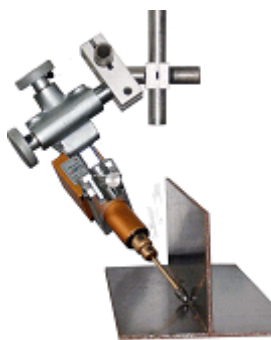


Side



③ LEFT

Front



Side

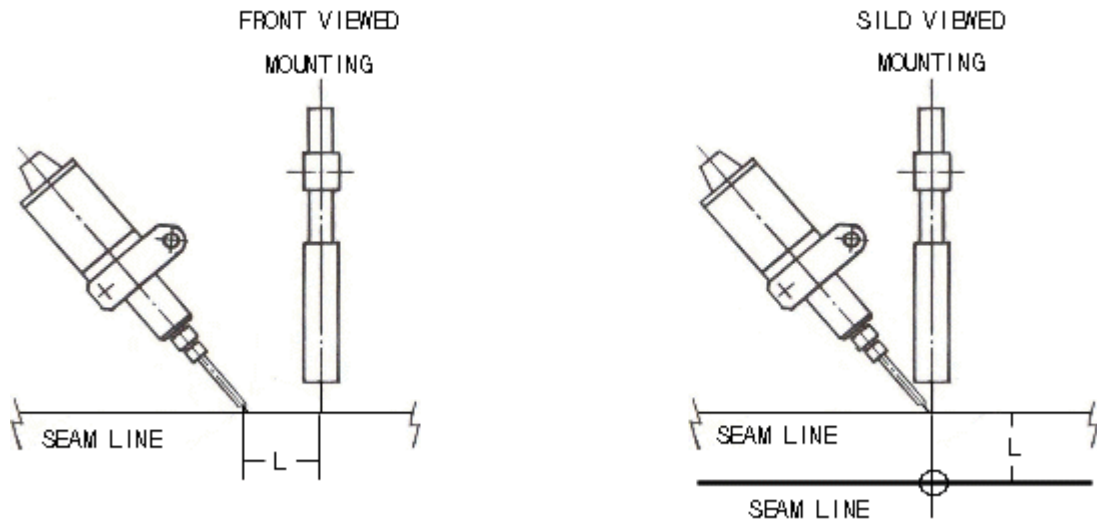


④ RIGHT/LEFT (picture on the back side)



2) Installation length between torch and sensor

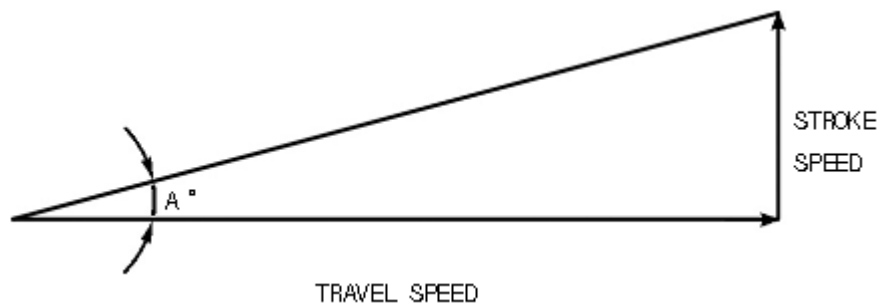
-The length between torch and sensor depends on the welding process.



Process	Length
SAW	App. 50mm
GMAW	App. 30mm
GTAW	App. 5 ~ 30mm

3) SENSOR DETECTION RANGE SETTING.

- The sensor detection range should be set based on the welding speed. For the speedy/faster welding, the detection range will be narrow and in the slow welding the range will be wide.



$$\text{Detection range } A^\circ = \text{TAN} \times \frac{\text{SLIDESPEED}}{\text{WELDINGSPEED}}$$

Ex.) Welding Speed : 800mm/min
 SLIDE SPEED : 200mm/min
 Max. detection range A° : 14°

For the model No. HMG-05, at the SPEED 800mm/min the range can be controlled up to max. 14°.

7-3, Interface for automation

1) How to connect relay 2, com, below to the auto controller of the welder or others.

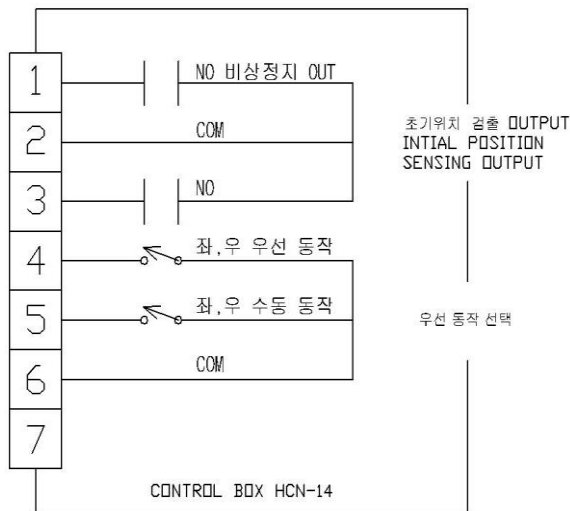
- This function is available at auto mode or position
- Output makes relay On or OFF
- Explanation on operation

(1) Before auto mode, the relay for MC OUTPUT connector pin 1(NC), 2 (COM) is On.

(2) In the mode of AUTO START RUN, the X,Y SLIDE will be moved down and the PROBE SENSOR will position the welding start point and the RELAY connected to MC OUTPUT CONNECTOR PIN 3(NO), 2(COM) will be ON

(3) The relay connecting to **MC OUTPUT connector** Pin 3(NO), 2(COM) is On at Auto Start run

* Please use Pin 2 and 3 in MC OUT connector for connection to your auto controller sequence for welder.



※ Explanation on the SLIDERS movement .

1. If the right/left movement function is selected as priority, the SLIDERS will move down to the setting direction and then the Seam Tracker will work on automatically.

2. In the Manual Mode, the SLIDER for left/right does not work, but the SLIDER for up/down works automatically.

The SLIDER for left/right can be operated manually in the REMOTE CONTROLLER

(4) As follows are the cases that relay connecting to MC OUTPUT connector Pin 3(NO), 2(COM) is Off.

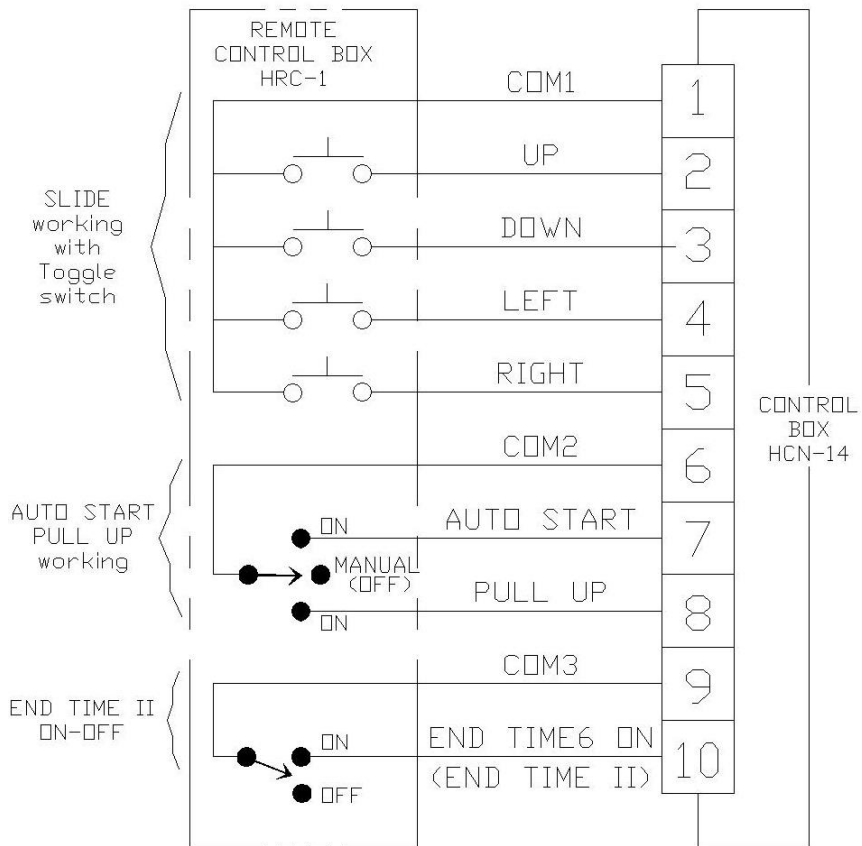
- ① Auto start off
- ② End Timer 1 or 2 runs
- ③ During running, the limit switch for slide X or Y is ON. The Emergency machine stops.

(5) E/M stop output

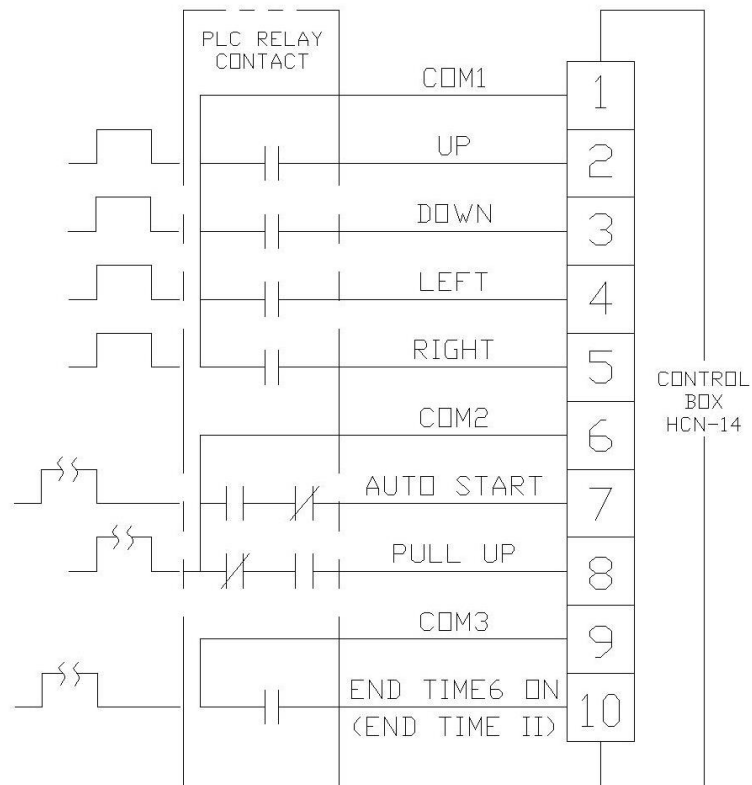
- ① If the limit switch for the slide X. Y is working at Auto start or the emergency stop TIMER 7 is working, it is Off.
The relay connecting to MC OUTPUT connector pin 4(NC), 6(COM) is On before E/M stop output
- ② The relay connecting to MC OUTPUT connector pin 2(NO), 1(COM) is On if E/M stop output
- ③ If E/M stop relay is Off, make auto start run Off.

2) INPUT (CON 6) connection for REMOTE CONTROL

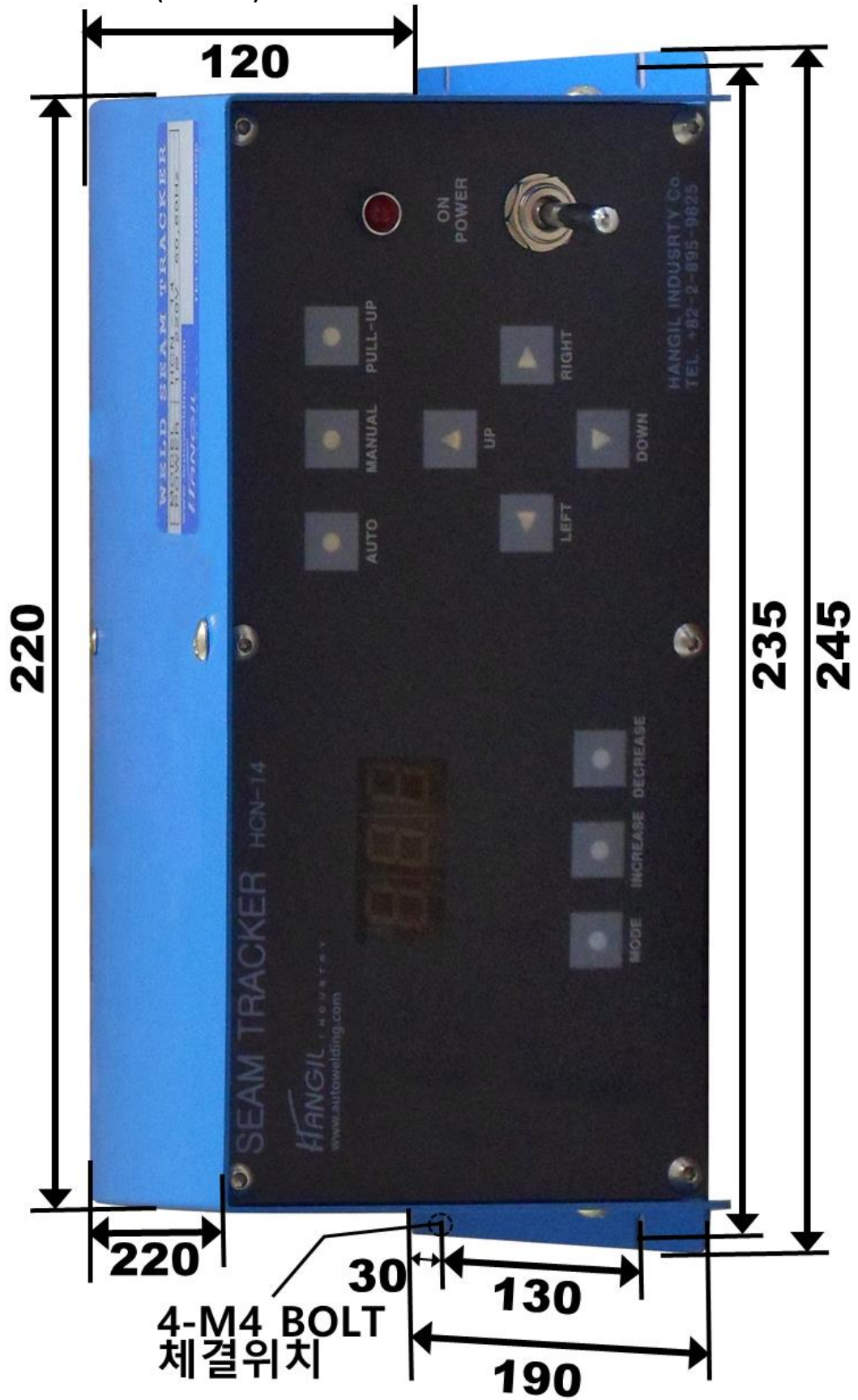
2-1) When to use REMOTE CONTROL BOX(HRC-1)

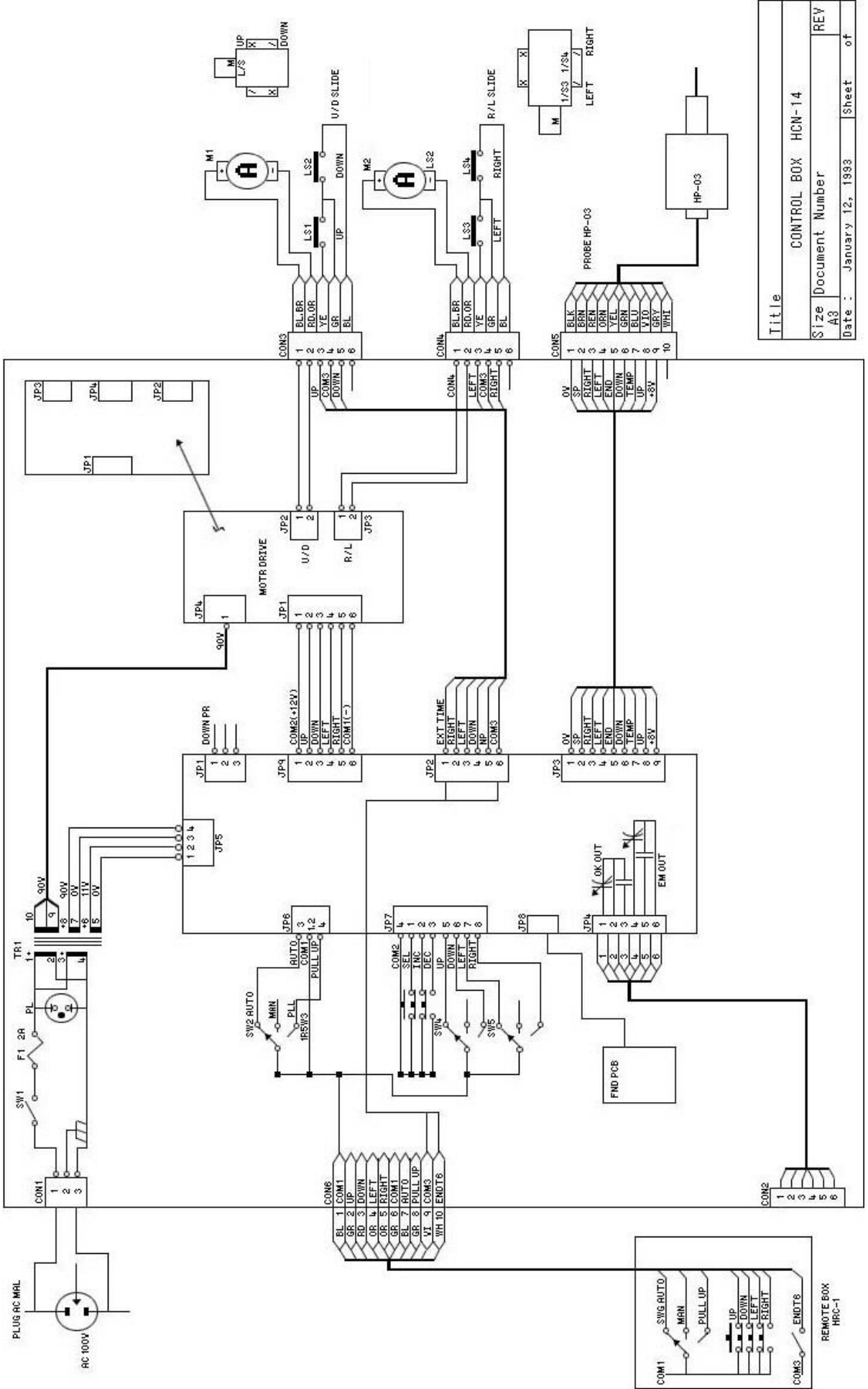


2-2) When to connect for interface to automatic equipment.

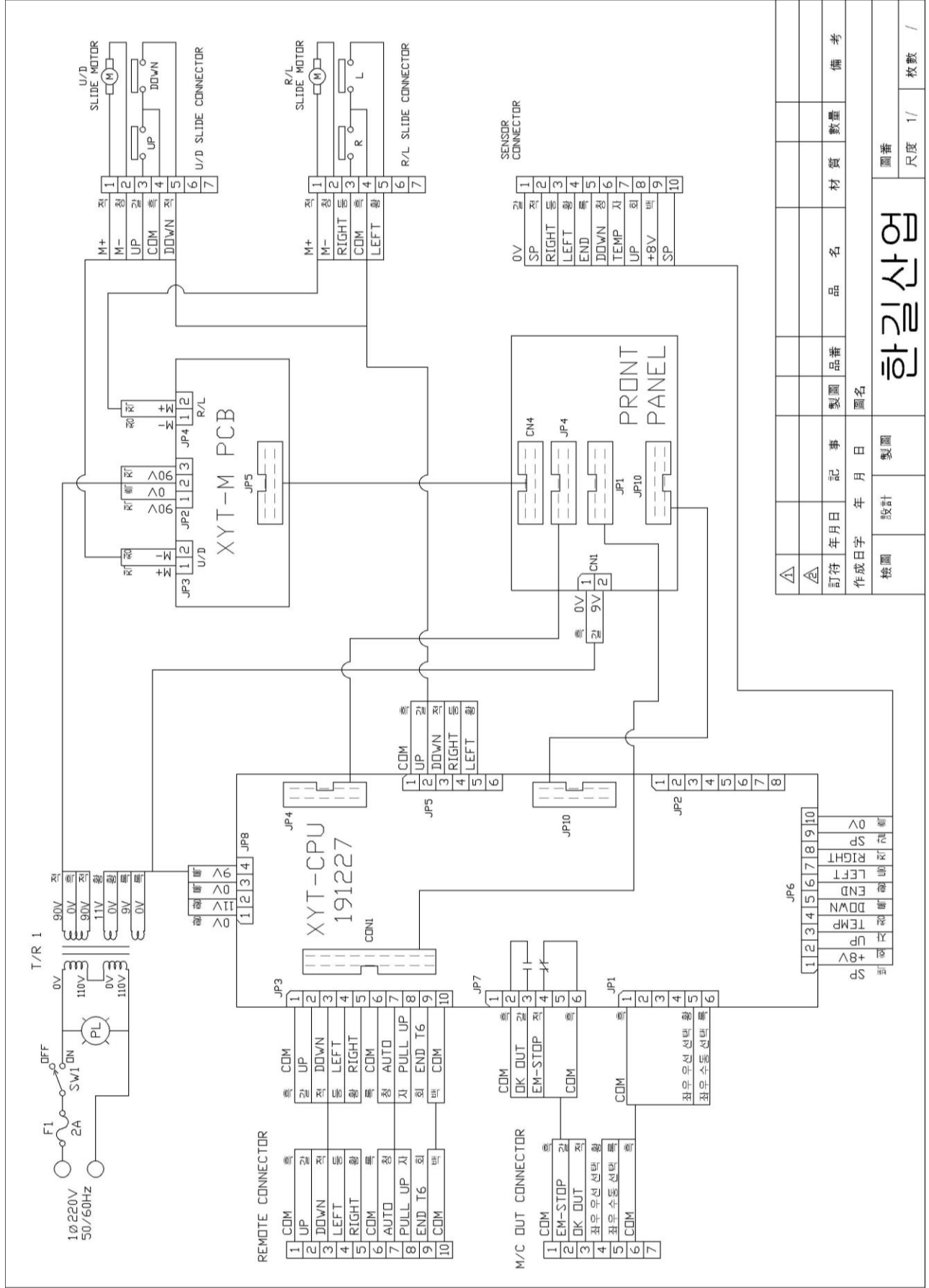


8. OUTLINE
8-1 CONTROL BOX (HCN-14)





Title	
CONTROL BOX HCN-14	
Size	Document Number
A3	REV
Date : January 12, 1993	Sheet of



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△

訂符 年月日 記事 製圖 品番 品名 材質 數量 備考
 作成日字 年月日 圖名

圖番	圖名
80	遙控器
>	TEMP
>	DOWN
>	END
>	LEFT
>	RIGHT
>	LS
>	RS

檢圖	設計	製圖	한글산업		
			圖番	尺度	枚數



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