

Section 12.1

IR Feeler

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12.1 IR Feeler

12.1.1 General

[1] Major Features

IR Feeler is a new type adopted Optics which has the following features. Those features help to increase high productivity and enhance product range.

- 1) Less consumption parts
- 2) Easier to set and adjust as well as possible to adjust feeler amplifier without using oscilloscope. Also more precisely adjustment can be done by use of oscilloscope displaying signal wave.
- 3) Less damage owing to fixed position of the sensor.
- 4) No need to re-adjust the feeler basically when changing kind of weft yarn or machine speed
- 5) Less influence of water quality on the feeler function
It enables to require no water softener because electricity conductivity is negligible in comparison with finger type electric feeler. Therefore, the cost of water softener can be saved, but the filter removing foreign materials in the water is recommendable to set. (2 lines of filter including low mesh, medium mesh and high mesh should be adopted.)
- 6) Applicable weft yarn range
Weft yarn range with 30d mono-filament to 300d is applicable. But in case of less than 30d, exclusive feeler head is required.

[2] Mechanism of IR Feeler

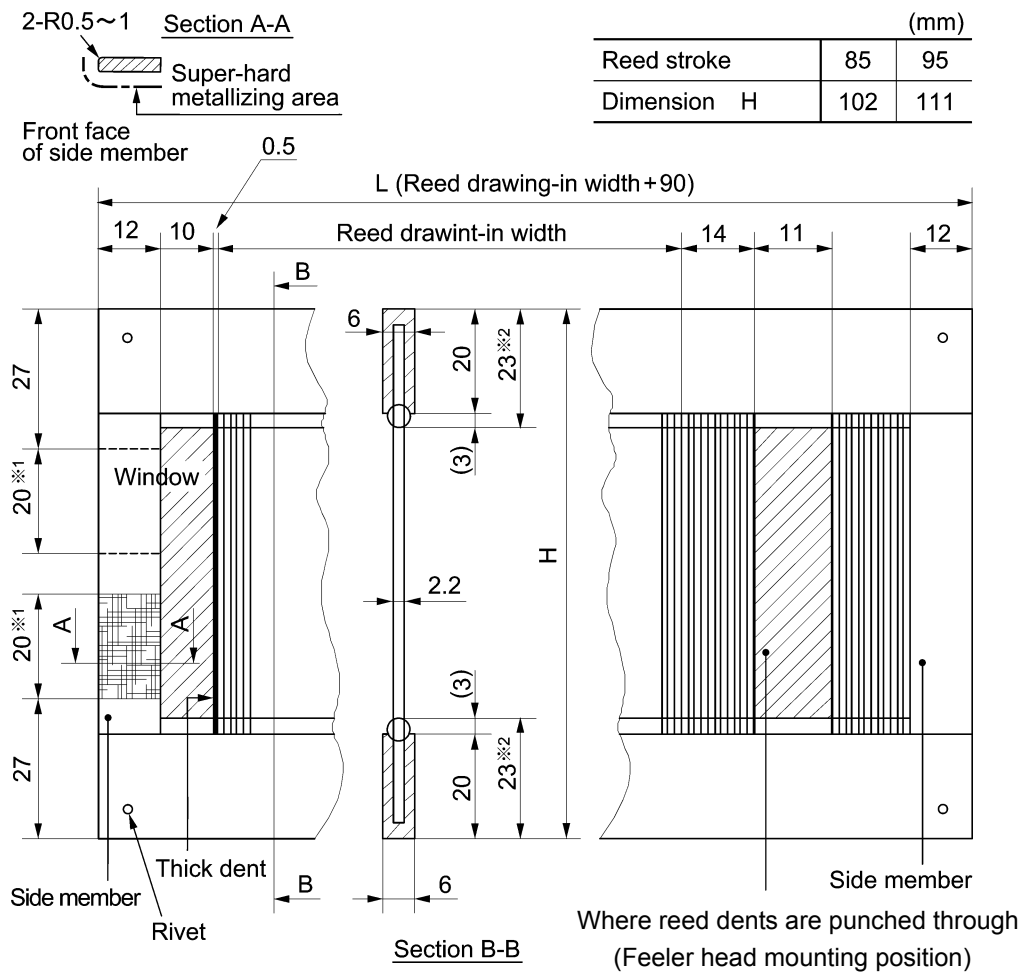
- 1) When weft yarn passes through the clearance of feeler head, IR feeler senses signal intercepting optical light from the sensor as a weft signal.
- 2) The feeler unit judges where this signal is among the "PS", and decide whether machine should run or stop.

Caution: If the timing light beam is irradiated at near the feeler head during loom running, wasteful stop or empty weaving may result due to the light entrance to the light receiving block. Be careful when the timing light is to be used for a long time.

[3] Dimensions of Reed (Refer to attached drawing 1 & 2)

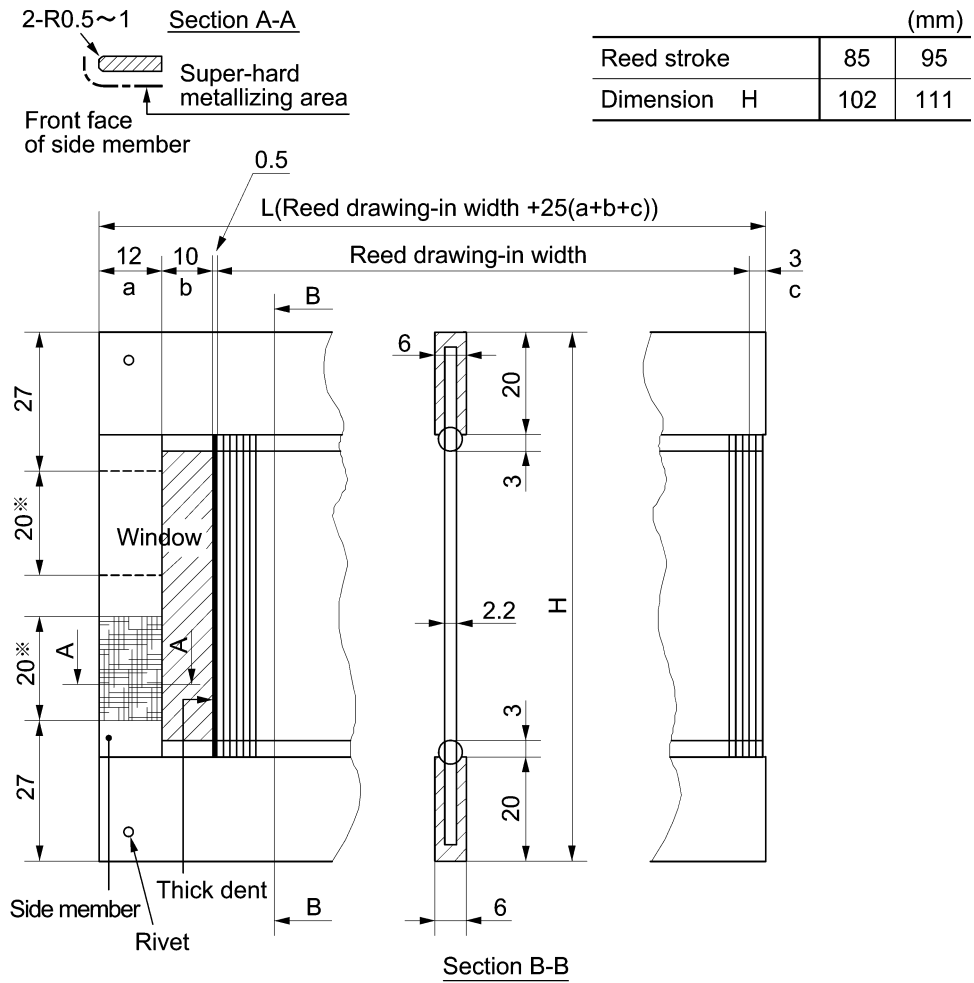
- 1) Provide a window or cut the reed dents as illustrated in Drawing 1 or 2.
Make the height of lower channel of reed less than 23mm because if more than 23mm the channel may touch the lower surface of the feeler head.
- 2) The upside-down reed can be used, but this reed is not reversible to the vertical direction (right to left).

Fig. 1 Reed for IR feeler (Punched dent type)



- ⚠ Caution:
1. This reed is for the use of water looms.
 2. Provide a 10mm wide window and a 0.5mm thick dent on either side of the reed as illustrated.
 3. There should be no density dispersion. The reed dent should be perpendicular to the bottom member within $90^\circ \pm 30'$.
 4. "Overall length $L \times \text{Density/Unit}$ " should be punched on the frame face.
 5. The two ※-marked areas on the front and the back of the LH side-member should be treated with super-hard metallizing (Praxair, Inc.: LW-IN30)
 6. Reed wire (SUS304) should be used.
 7. Dimension marked ※2 should be less than 23mm. If exceeding 23mm, the upper side of reed may touch the lower face of feeler head.

Fig. 2 Reed for IR feeler (Dummy reed type)



- ⚠ Caution:
1. This reed is for the use of water jet looms.
 2. Provide a 10mm wide window and a 0.5mm thick dent on either side of the reed as illustrated.
 3. There should be no density dispersion. The reed dent should be perpendicular to the bottom member within $90^\circ \pm 30'$.
 4. "Overall length $L \times$ Density/Unit" should be punched on the frame face.
 5. The two ※ -marked areas on the front and the back of the LH side-member should be treated with super-hard metallizing (Praxair, Inc.: LW-IN30)
 6. Reed wire (SUS304) should be used.

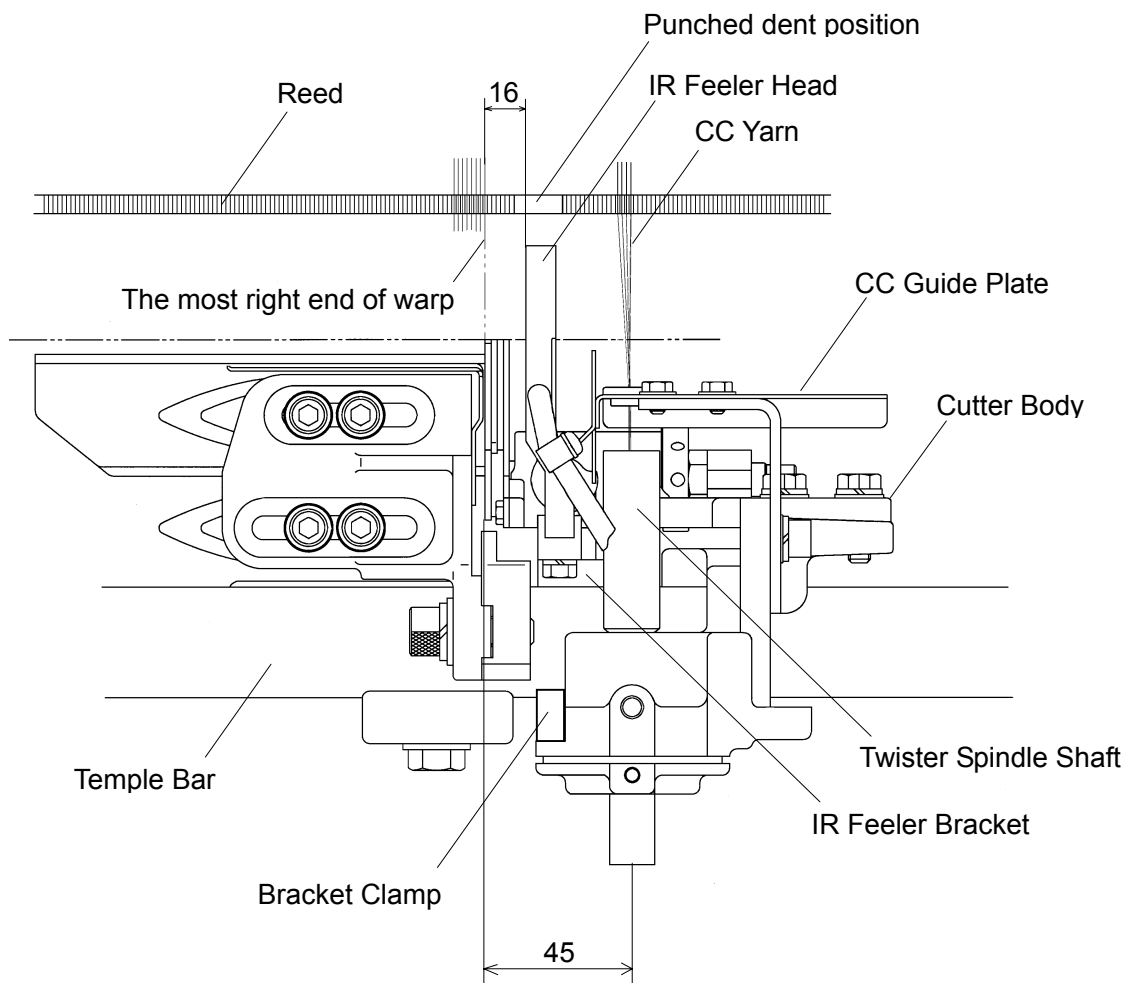
12.1.2 Adjustments of the Mounting Position of the IR Feeler Head

[1] Attaching Reed

- 1) Attach reed in the horizontal position to the reed holder as feeler may touch the reed if attached upper in the right side.
- 2) Adjust the eccentric-head type bolt so as to set reed in the lowest position.

[2] The Crosswise Position of Feeler Head

- 1) So that the feeler head comes 17mm from the most right end of warp, fix feeler head bracket to temple bar by bracket clamp after moving IR feeler head bracket.

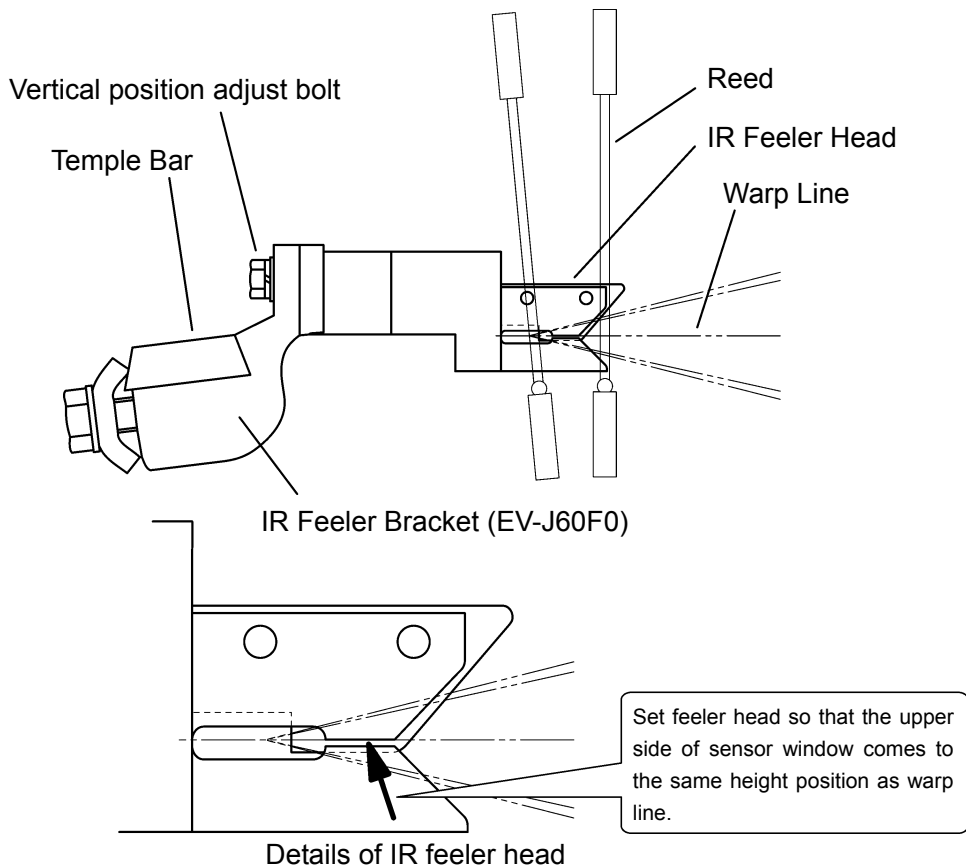


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[3] The vertical Position of Feeler Head

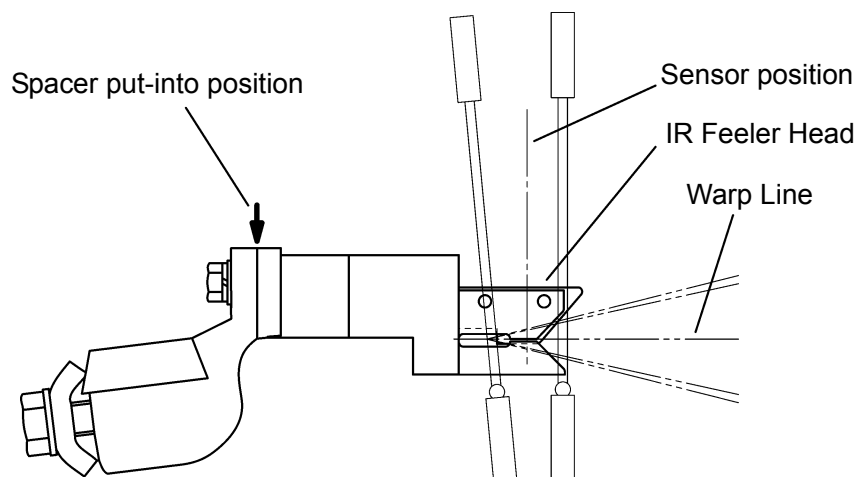
Set the feeler head so that the upper side of the sensor window comes to the same height position as warp line.

- 1) Make shed closed
- 2) Remove Jet Funnel
- 3) After adjusting so that the upper side of the sensor window comes to the same height position as warp line, fix it by vertical position adjust bolt.



[4] The front and Back Position of Feeler Head

Adjust the front and back position of feeler head by a spacer so that weft yarn passes through the sensor of feeler head at the machine timing of 310-320°.

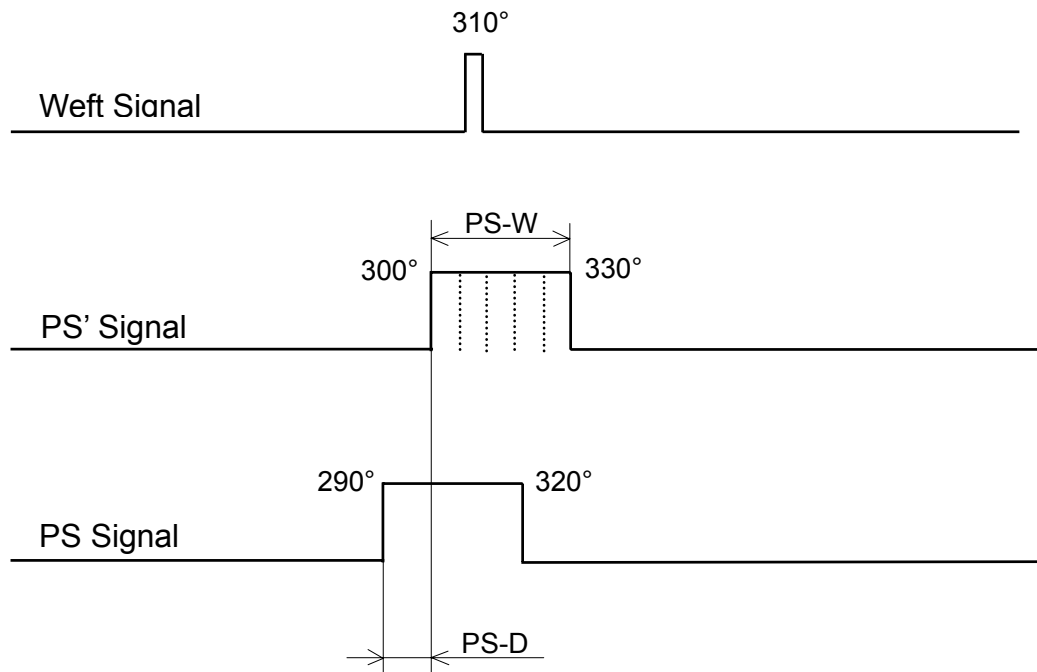


12.1.3 IR Feeler Unit

[1] Easy Setting of Feeler Unit (at 600rpm)

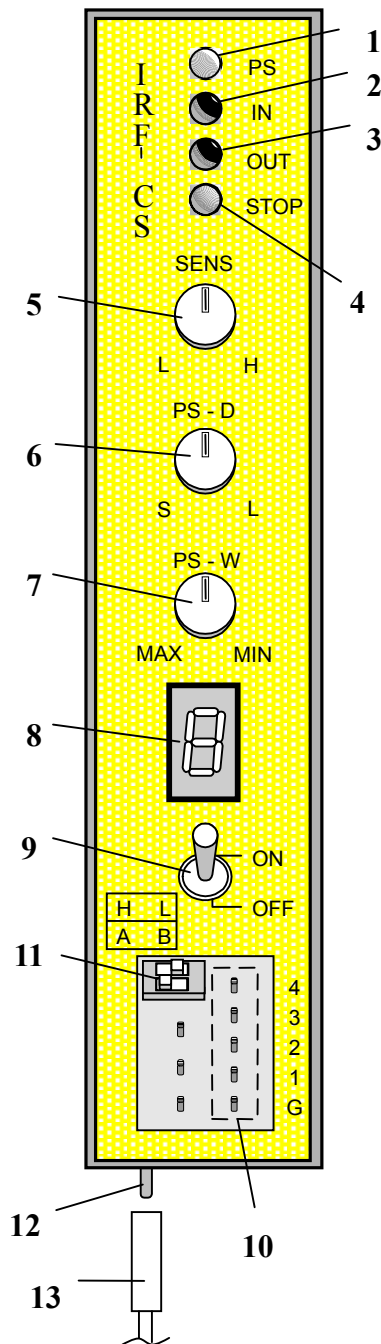
- 1) Turn volume switch "SENS" to the position between 12 o'clock and 1 o'clock.
- 2) Turn volume switch "PS-D" to the position of 11 o'clock (supposed to be delayed 3ms)
- 3) Turn volume switch "PS-W" to the position between 11 o'clock and 12 o'clock.
(make width of PS 30°)
- 4) After restarting loom, adjust precisely "PS-D" and "PS-W" so that display panel is constantly showing "1" or "2" .
- 5) Then turn volume switch "SENS" to the counterclockwise direction upto which position loom stops. And turn it by 2 hours to the clockwise direction from that position.

[2] Relations between Weft Signals, PS and PS'



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[3] Operation Panel and Its Functions



1. PS lamp
When PS signal is transferred to IR feeler unit, PS lamp turns on.
IR feeler gets loom PS signal (hereunder called "PS") and then makes dummy PS signal (hereunder called "PS') internally.
2. IN lamp
When weft yarn passes through the sensor of IR feeler head, IN lamp turns on.
3. OUT lamp
When "weft yarn exists" is recognized after treating IN signal, OUT lamp turns on.
(Red lamp of signal tower blinks)
4. STOP lamp
When loom stops by IR feeler, STOP lamp turns on.
5. SENS volume switch
Sensitivity can be adjusted by this.

Direction	Sensitivity
L (Low)	down (direction to failing to stop)
H (High)	up (direction to false stop)
6. PS-D volume switch
(set PS-ON timing)
By this, delayed timing can be adjusted.

S direction	hasten timing
L direction	delay timing
7. PS-W volume switch(set PS-OFF timing)
Time(width) of PS signal can be adjusted.

MAX	PS timing width: widest (15msec)
MIN	PS timing width: arrowest (4msec)
8. IN-TIME display
PS timing width is divided evenly into 5 and numbers from 1 to 5 are put to each divided width. Out of 5 numbers, number where weft yarn is passing through feeler can be displayed.
9. OUT switch : On-off switch of feeler function

10. Test Pole

Test pole is for picking up signals of feeler. By connecting it with oscilloscope, you can watch the signal waveform.

No.	Description
4	Secondary amplification of output signal from IR feeler head
3	Primary amplification of output signal from IR feeler head
2	PS' signal
1	Output signal from IR feeler head (raw signal)
G	Earth

11. Selector switch of input filter and selector switch of signal logic

Upper side one of the panel is selector switch of input filter and lower is selector switch of signal logic. Normally set selector switch of signal logic to A side. In case that set to B side, irregular blinking of signal tower lamp or flicking of red lamp in the signal tower even when loom stops by the cause of weft may happen.

How to select selector switch of input filter

Basically it should be set to the position of L. In the following cases, it should be set to the position of H.

- 1) More than 400d of weft yarn to be used
- 2) Lower operating speed such as 400~500rpm
- 3) False stops happen very often

12. Terminal

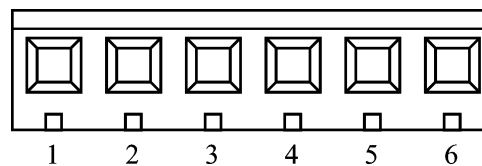
This is the terminal for picking up signals of IR feeler head.

13. Housing (main harness)

Type : 5239-N6 poles, made by Nippon Molex Co.,Ltd.

Contactors : 5167PBTL 5 pcs

No.	Description
1	E (Red)
2	F • OUT (White)
3	D • OUT (Black)
4	PS (Yellow)
5	—
6	+12V (Green)



Main harness connector mating portion

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[4] Details of Each Functions

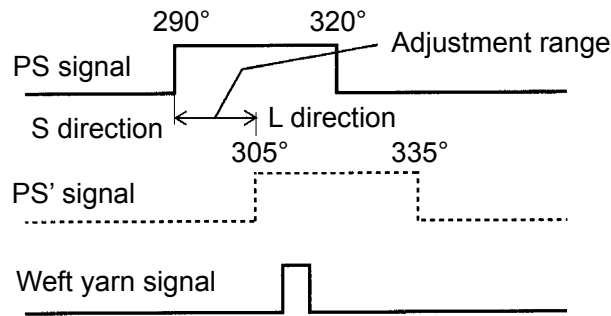
(1) How to adjust SENS volume

- 1) Turn SENS volume switch to the position of "H". (Turn it clockwise to the position where it stops)
- 2) Operate loom.
- 3) Turn SENS volume switch counterclockwise (=to L direction) to the position where the loom stops by the cause of false stop.
- 4) From the above (3) turn it 60° to H direction (=clockwise)
This position is the position of SENS volume switch to be adjusted correctly.

(2) PS-D volume

This is for adjustment of PS timing delay. It is adjusted that at which portion signal caused when inserted weft yarn passes through feeler head at beating by reed should be passed. For this adjustment, by means of PS-D volume switch, PS' timing can be delayed electrically.

Turn to S direction	Signal of ON (rising position) of PS' becomes far from yarn signal.
Turn to L direction	Signal of ON (rising position) of PS' becomes close to yarn signal.

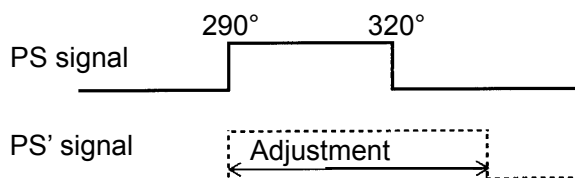


Example:

The timing of PS between "On" and "Off" (timing of 30° between 290° and 320°) can be adjusted to be 300~330° by delaying 15° timing by use of PS-D volume switch, without adjusting the position of proximity arm collecting PS signal.

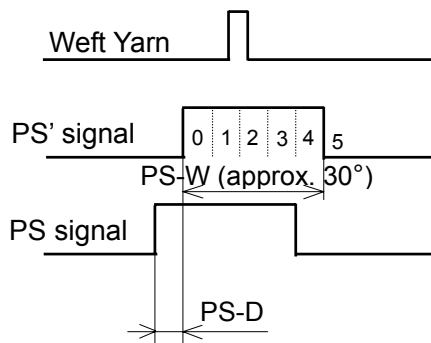
(3) PS-W volume switch

This is for adjustment of making PS' signal narrower or wider without changing PS input timing. Normally PS' signal should be set 30° but depending on the loom speed it should be adjusted.



(4) IN-TIME display

This shows the position of weft yarn signal out of PS' signal's positions.



Weft yarn signal : This changes according to the forward and reverse position of feeler head. If this signal deviate widely, weft insertion should be made stable.

PS' signal : On the base of rising position of PS signal, it can be adjusted by PS-D volume switch. Width of PS' signal can be adjusted.

PS signal : It varies by adjusting by use of presetter of PAW controller.

The standard is On at 290° .

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12.1.4 Trouble Shooting

- 1) In case that figure shown in the IN-TIME display very often changes from “1” to “4”, the followings should be confirmed.
 - a. if the vertical position of feeler head is correctly adjusted.
 - b. if the top of weft yarn is keeping stable when weft yarn passes through the sensor of feeler head.
 - c. if the maximum weft yarn stretch timing is even.

- 2) When the figure shown in IN-TIME display is “0” and warning indicator LED turn on or blinks.
 - a. “0” means that weft yarn signal is detected before the position of PS’.
Turn PS-D volume switch counterclockwise so that displayed figure comes to “1” or “2”.

 - b. Turning on or blinking of LED lamp shows warning. Especially “0” means that it has much tendency to fail to stop. So the following items should be checked and adjusted so that LED lamp turns off.
 - if the position of SENS volume is not “H”.
 - if jetting water is flying extremely to the side of feeler head
 - if the mounting position of feeler head is not too high.
 - if feeler head does not touch reed
(Especially in case that the lower side of feeler head touches reed, feeler head may be broken.)

- 3) If figure shown in IN-TIME display is neither “0” or “5” and warning indicator LED lamp turns on or blinks, check the following items.
 - if the mounting position of feeler head is not too high.
 - if jetting water is flying extremely to the side of reed.
(check especially in case of short-stroke specification)

- 4) If weft pick failure or incorrect stopping occurs frequently, check if the IR feeler head cable is set as shown by the photo.

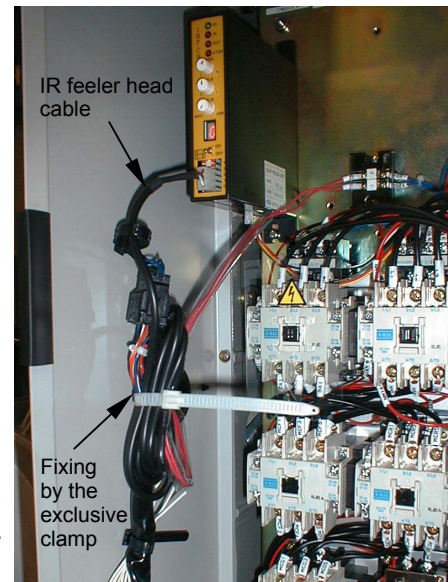
The feeler malfunctions if IR feeler head cable is too close to the power cable (insufficient distance between the plant power cable and the inverter cable).

Reference:

A checker for electrical check of the feeler head is available.

Part name: Tool, IR Checker

Please contact our Sales Dept. for inquiries.



12.1.5 Reference Data

rpm \ PS-W	400rpm 2.4°/ms	500rpm 3.0°/ms	600rpm 3.6°/ms	700rpm 4.2°/ms	800rpm 4.8°/ms	900rpm 5.4°/ms	1000rpm 6.0°/ms	PS' ON time
0 ^{min}	9.60	12.00	14.40	16.80	19.20	21.60	24.00	4.0ms
1					24.48	27.54	30.60	5.1ms
2				26.04	29.76	33.48	37.20	6.2ms
3			26.28	30.66	35.04	39.42		7.3ms
4		25.20	30.24	35.28				8.4ms
5		28.50	34.20					9.5ms
6	25.44	31.80						10.6ms
7	28.08	35.10						11.7ms
8	30.72							12.8ms
9	33.36							13.9ms
10 ^{max}	36.00	45.00	54.00	63.00	72.00	81.00	90.00	15.0ms

PS' ON degree = PS ON time × degree per 1ms

Example:

If PS-W is set 8 at the speed of 400rpm, the degree where PS' is turning on comes to : $12.8\text{ms} \times 2.4^\circ/\text{ms} = 30.72^\circ$

