
SONY
CE
HA705LK-905
HEAD ASSEMBLY
P-F97939605-2
S01-0006403-%
D060331V2.10
Sony Manufacturing Systems Corporation
MADE IN JAPAN

SONY

CE

HA705LK-905

HEAD ASSEMBLY

P-F97939605-2

31V2.10

ORDER : 48227479 IRASCO LABEL
MATERIAL CODE: 405011720033
TYPE:
H705LK-905

DESCRIPTION:
HEADER MOD.HA705LK-905 WITH 2.5 M AND CONNECTOR RM15WTJA-8S
(FOR STAND F7)


MADE
IN
JAPAN


MADE
IN
JAPAN


HA705
LK905
06403

SONY®

HA-705LK

Instruction Manual

This manual provides instructions for installing HA-705LK as used in combination with MSS-976R.

DEC. 1985

2-995-564-03

Sony Magnescale Inc.

C A U T I O N F O R U S E

* Before starting to use Sony Magnescale equipment, be sure to check that it works correctly.

* Be sure to provide sufficient safeguard so that extensive damages may be prevented in case of malfunction.

* If the equipment is used neglecting specifications or remodeled by yourself, the functions and performance will not be guaranteed.

* Use of the equipment combined with others than those recommended by us may result in malfunction depending on operating conditions and environments.
  For satisfactory use, therefore, make careful study on the combination beforehand.

C O N T E N T S

1. General

The system is composed of the MSS-976R scale, the HA-705LK head assembly and a detector or display unit, and detects linear position or displacement with high accuracy. The detecting accuracy depends on the installation and adjustment of the scale and head, and therefore, it is required to make correct installation and adjustment of the scale and head as instructed by this manual, and to make correct electircal adjustment of the detector or display unit according to its own instruction manual.
This instruction manual on HA-705LK also applies to HA-705K which is of different electrical specifications but with the same outside dimensions as HA-705LK.

2. Composition

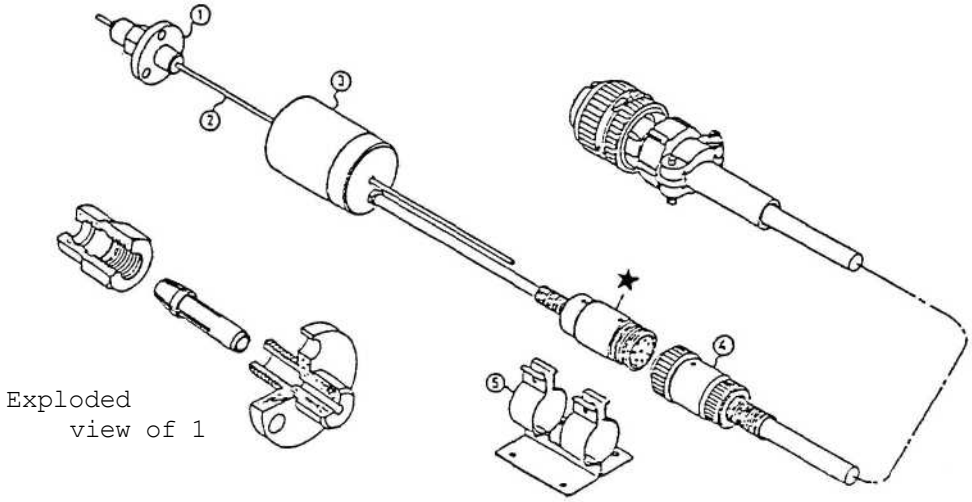


Fig. 1

Note) HA-705LK (5) purchased without the optional connector marked (*) has its leads unterminated.

Composition			
No.	Model Name	Description	Specification
1	SZ705	Scale rod chuck	
2	MSS-976R	Linear Magnescale (co-axial type) The accumulative errors, particular to respective effective lengths, do not include installation errors.	Scale pitch: 200 [μm] Accumulative error: 3μm for 200mm effective length 4μm for 400mm effective length 6μm for 600mm effective length Thermal expansion co-efficient: $14 \pm 1 \times 10^{-6}$ Operating temperature: -5 ~ +40°C
3	HA-705LK	Head assembly of waterproof type The connector is optional.	Inner head: Waterproof and low-impedance type Cable: 7 cores with shield sheath Connector: RM15WTJA-8S-(5) by HIROSE. Waterproof type proved in the 1.8m deep water for 24 hours, 20mV voltage drop with 5A contact resistance. Resistible against 1500VAC for one minute. Insulation resistance: Over 5OMΩ between coils, between coil and head, between head and head housing, and between shield sheath and head.
4	MK3-100 MK3-150	Connecting cable 100m Connecting calbe 150m	Used to connect HA-705LK and MSD-560N Connector to head: RM15WTPA-8P-(9) by HIROSE. Waterproof type proved in the 1,8m deep water fox 24 hours. 20mV voltage drop with 5A contact resistance. Resistible against 1500VAC for one minute. Connector to detector: MS3106B18-1P, MS3057-10A
5		Connector holder	

Above-named products can be purchased individually.

3. General Instructions on Installation

3-1). Mount the scale as near as possible to the center of the slide way concerned so that the Abbe error may be lessened.

3-2). Mount the head on the stationary member of the machine (so that it may not be affected by vibration and shock) and the scale on the movable member.

3-3). When the scale is mounted horizontally, it may bend due to its own weight. Be sure, therefore, to fix the scale of effective length over 300mm at its both ends, while a scale of 300mm or shorter effective length can be fixed at its one end.

3-4). House the Magnescale in a mild steel or non-magnetic metal case so that it may be protected from dust, chips, water-splash or magnetic flux, and purge the air from the scale housing.

3-5). Magnetic flux around the head should be less than 2 gauss. If it is over 2 gauss, demagnetize the head housing and its surroundings.

3-6). It is recommended, in mounting the scale and head, to apply grease and lubricating oil a little, since they work against wear and for smooth sliding without causing damage to the scale and head.

3-7). Tools such as a screw driver and a wrench may be magnetized at their tips. Be sure, before use, to demagnetize them and, further, do not bring them close to the scale rod nor touch it with them.

3-8). If water-soluble emulsion cutting oil wets the scale, and the machine is kept standstill for a long time, the scale and the head may stick to each other. To prevent such a trouble, protect the scale from cutting oil with an appropriate cover.

4. Installation of Head and Scale

4-1). The zero point of scale graduations is positioned as shown in Fig. 2. The magnetic graduations are recorded on the overall length; however, pay attention that the specified accuracy is obtained just within

the effective length. As for the specified accuracy, refer to the accuracy chart attached.

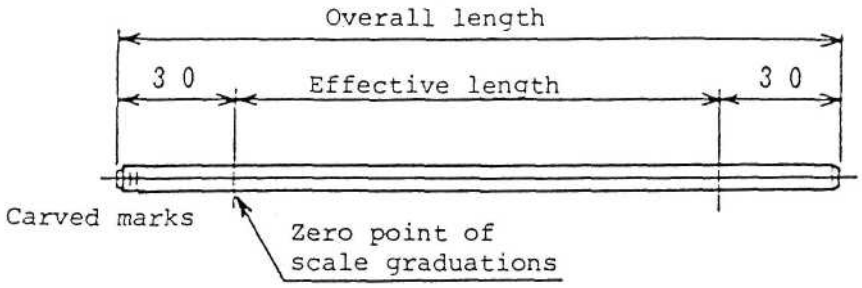


Fig. 2

4-2). The detecting area of the head is 7.3mm wide as shown in Fig. 3. Set the sliding range of the scale taking into account the relative positions of scale and head detecting area. Note that "0" in the accuracy chart is the position read out when the zero point of scale graduations falls in with the center of the head detecting area.

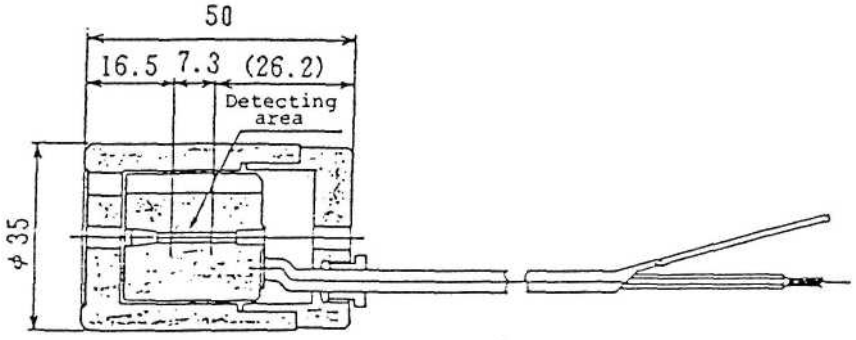


Fig. 3

4-3). The practical tolerance in scale-head alignment is obtained with longer dead span (the distance between the head and the scale rod chuck where no measurement is made). See Fig. 4 as a reference, in which the dead span is 100mm, and the alignment tolerance is 0,2mm or less.

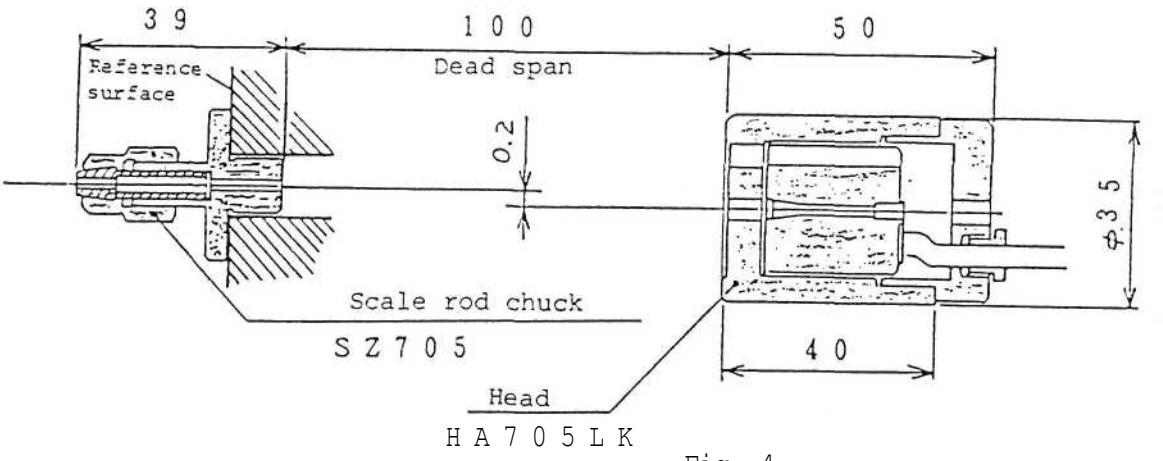


Fig. 4

4-4). Fix the scale at the side where zero point is marked. Install the scale and the head parallel to the moving direction within their specified parallelism:

Scale : 0.1/100mm or less, and
Head housing : 0.04/50mm or less.

4-5). Up to 4-4) above, the scale rod chuck and the head have been installed. Now make sure that the scale moves smoothly between the chuck and the head. If it does not, correct the alignment.

5. Wire Connection to Connector (when connecting head wires to the connector after the head has been mounted on the machine)

Complete waterproofness can not be realized on the connector, since the head lead wires are armored by braided -wires. To provide complete waterproofness, cover the lead wires at the connector shell with heat-shrink tubes (THERMO-FIT TUBE, ATUM 12/4 and ATUM 24/8, with adhesive inside, made by RAYCHEM). Two THERMO-FIT TUBEs are required for different shrinking ratio.

5-1). End dressing of lead wires (See Fig. 5)

1) Cut every lead wire to its required length L.

2) Peel the braided wires by 11±1mm at the end, and twist them into one.

3) Peel the outer resin tube (which covers all the lead wires) by 11±lmm at the end.

4) Cut the green lead wire by 5±lmm at the end.

5) Peel the respective resin tubes of the lead wires, except the green one, by 2±0.5min at their ends.

6) Apply solder on the twisted braided wire and the seven naked lead wires.

5-2). Soldering of lead wires to connector pins

1) Disassemble the connector, and set its required parts and the two THERMO-FIT TUBEs on the head lead wires as shown in Fig. 6.

2) Cover the cut end of the green lead wire with a vinyl tape so that it may not touch the connector or other lead wires. (Note 1)

3) Set insulating tubes on the twisted braided wire and the seven lead wires (except the green one), and solder the wires to the connector pins referring to the wiring diagram.

4) Reassemble the connector, and blow hot air (of a drier) to the small THERMO-FIT TUBE (12) and then to the large one (13) to shrink them (See Fig. 7). At this moment, be sure not to expose the head lead wires to the hot air.

Names in the figures:

Fig. NO.	No.	
Fig. 5	1	HA-705LK
Fig. 8	2	Connector RM15WTJA-8S-(5), HIROSE
Fig. 6 Fig. 7	3	Barrel
	4	screw
	5	End barrel
	6	Bush
	7	Washer
	8	Cable spring
	9	Screw
	10	Clamp nut
	11	Vinyl tube
	12	THERMO-FIT TUBE, ATUM 12/4
	13	THERMO-FIT TUBE, ATUM 24/8
	14	Dressed wire end

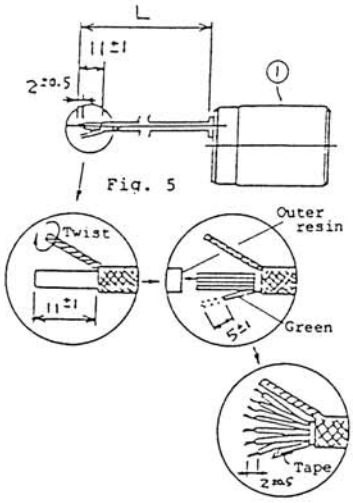


Fig. 5

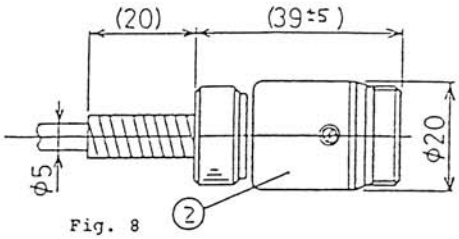
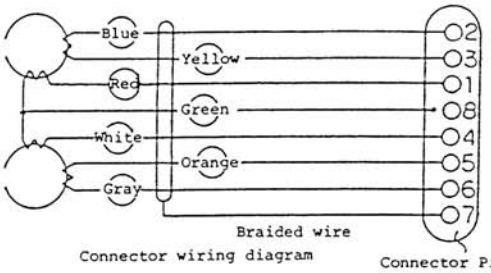


Fig. 8



Connector wiring diagram

Connector Pin No.

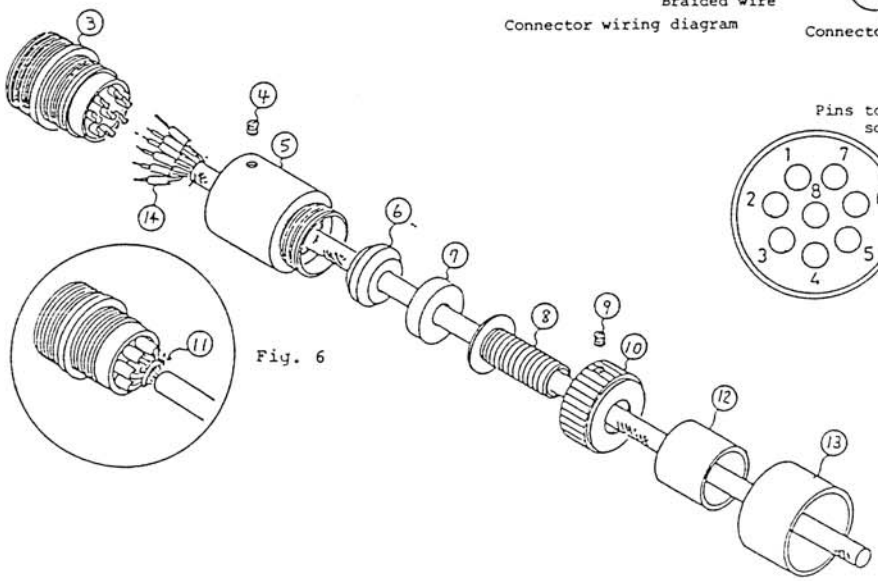


Fig. 6

1 Red
2 Blue
3 Yellow
4 White
5 Orange
6 Gray
7 Shield sheath (Braided wire)

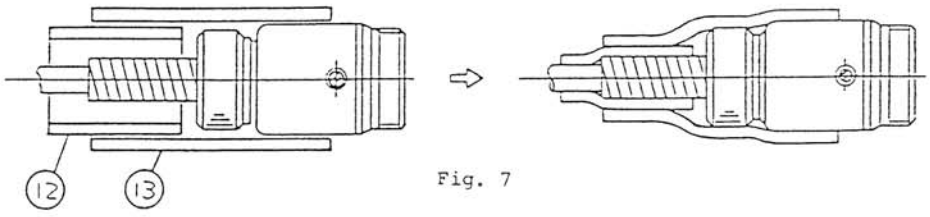


Fig. 7

6. Accuracy

The accuracy of the graduations recorded on the scale is as described in the attached accuracy chart. The interpolation accuracy, reading accuracy of values smaller than 200ym, however, depends on the electrical adjustment of the detector or display unit, the adjustment which is made referring to the PM ripple waveform. The more exactly the adjustment is made, the less the interpolation error becomes. For details on the electrical adjustment on the detector or display unit, refer to its own instruction manual.

Besides the interpolation error, the following may be the cause of reading error. Check and correct them.

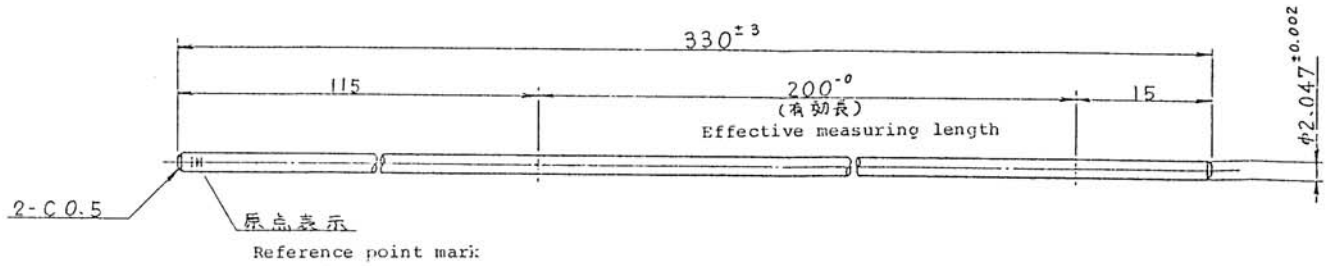
1. The scale is not installed exactly.
2. The machine travel is not straight enough.
3. The variation of the environmental temperature is too great.

7. Tolerance

Parellelism in installation		Head-scale misalignment
Scale	Head	With 100mm dead span
Better than 0,1/100mm	Better than 0,04/50mm	Less than 0,2mm

8. Maintenance

It is recommended to check and readjust the PM ripple periodically every year or more frequently, if required, to keep the system with high accuracy. For detailed PM ripple adjustment, refer to the instruction manual of the detector or display unit.



品　名：ロッドスケール

型　名：MSS-976R

仕　様：1) 磁気目盛ピッチ　200μm

2) スケール精度　$3+\frac{3}{1000}\cdot L$ [μm]

L= 有効長　於 20°C

3) 使用温度範囲　−5°C ～ +40°C

4) 熱膨張係数　$14^{\pm 1}\times 10^{-6}$ /°C

5) 全長記録

Product name: Rod scale
Code name: MSS-976R
Specifications: 1) Magnetic graduation pitch 200μm
2) Scale accuracy $3+\frac{3}{1000}L$ [μm]

L= Effective measuring length at 20°C

3) Operating temparature −5°C～+40°C
4) Thermal expansion coeffficient $14^{\pm 1}\times 10^{-6}$ /°C
5) Pitches recorded throughout the overall length

⚠*		−	− −		
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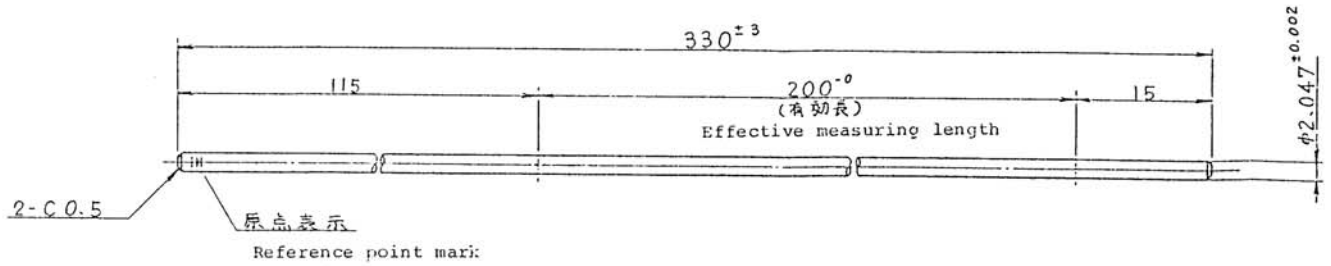
⚠*	/	−	85.12.9	本図を基準とする	小林(忍)
HISTORY	SUFFIX	ECN-NO	DATE	REVISION	CHK

USED ON: MSS-976R
UNIT: mm
ANGLE: 3rd
SCALE: 2/1
TOLERANCE:
MATERIAL:
FINISH:
TITLE/DESCRIPTION: Outline drawings 外形寸法図
PART NO: C-2903-194-1
DRAWING NO: SB-F
SHEET: 1/1

APPROVED BY		85.12.9	− −
CHECKED BY	塚本		− −
DRAWN BY	大澤		− −

SONY

REVISED



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⚠*		−	− −		
⚠*		−	− −		
⚠*	/	−	85.12.9	本図を基準とする	小林(忍)
HISTORY	SUFFIX	ECN-NO	DATE	REVISION	CHK

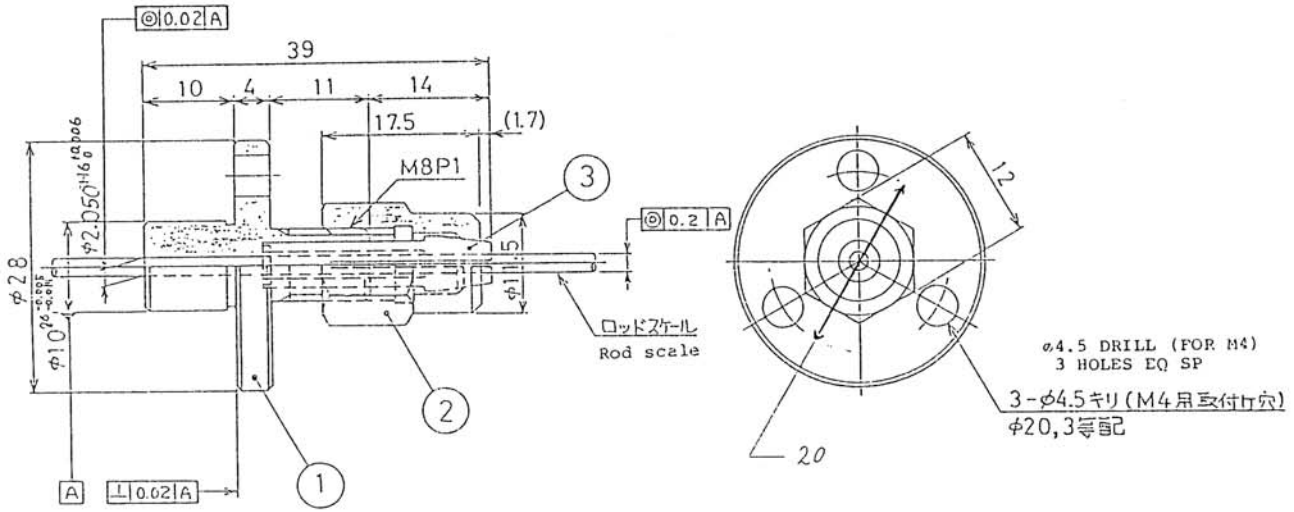
USED ON: MSS-976R
UNIT: mm
ANGLE: 3rd
SCALE: 2/1
TOLERANCE:
MATERIAL:
FINISH:
TITLE/DESCRIPTION: Outline drawings 外形寸法図
PART NO: C-2903-194-1
DRAWING NO: SB-F
SHEET: 1/1

APPROVED BY		85.12.9	− −
CHECKED BY	塚本		− −
DRAWN BY	大澤		− −

SONY

REVISED

NO.	DESCRIPTION	REMARKS	QTY
1	Bracket	C3560	1
2	Chuck cap	SCM3	1
3	Chuck	S45C	1



⚠×		–	– –		
⚠×		–	– –		
⚠×		–	– –		
⚠×		–	83-7-12	本図番登録	長野
HISTORY × UNIT	SUFFIX	ECN-NO	DATE	REVISION	SIGN

USED ON: SZ 705

APPROVED BY: 鈴木 (85.10.9 主事)

CHECKED BY: 大野

DRAWN BY: 笛下

UNIT: mm
ANGLE: 3rd
SCALE: 2/1
TOLERANCE: JIS B 0405

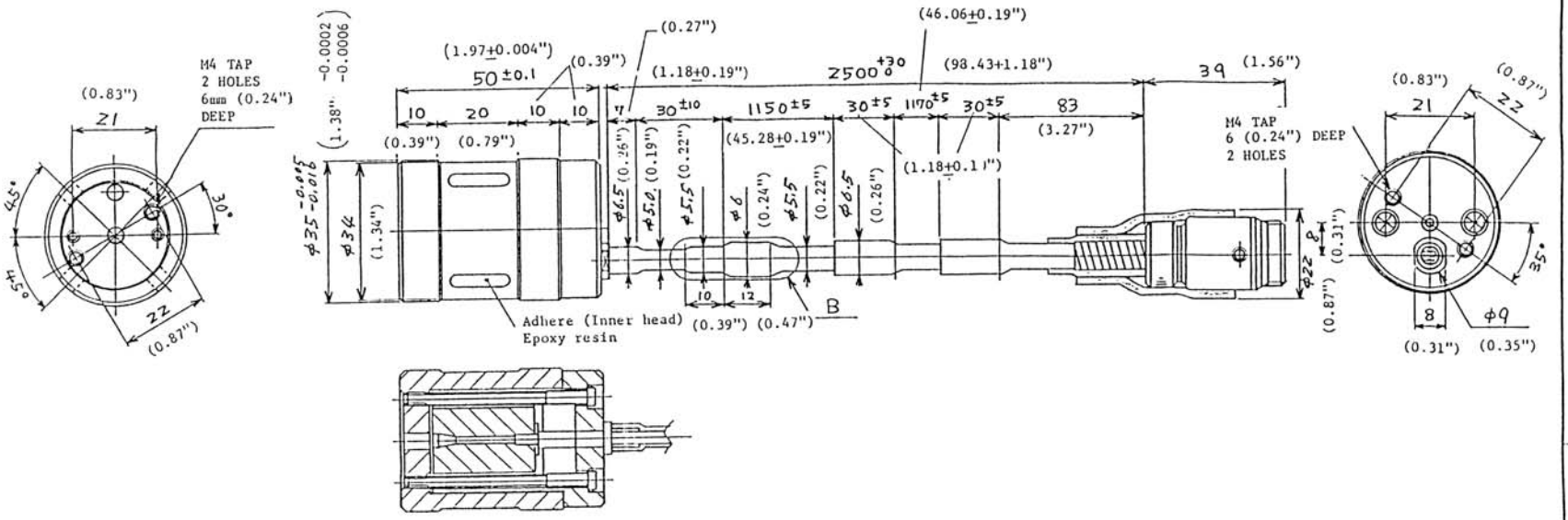
L≦4	±0.1
4<L≦16	±0.2
16<L≦63	±0.3
63<L≦250	±0.5
250<L	±0.7

MATERIAL:
FINISH:
TITLE/DESCRIPTION: Bracket assembly
SZ705 (ブラケットアセンブリ)
PART NO: C-2940-661-1
DRAWING NO: SB-F
SHEET: 1/1

SONY

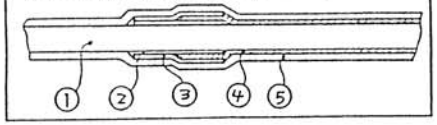
SONY STANDARD 3-822-800-44 '77 10
DRAWING (TYPE F-30)
SCALE FOR MICROFILM

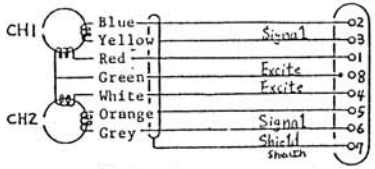
SONY



Details B

Shield end treatment
1. 7-core cable
2.3. Heat-shrinkable Teflon tubing
4. Braided wire
5. Heat-shrinkable tubing ATUM 6/2





Wiring diagram Connector

ISOLATION RESISTANCE: 50MΩ MIN at 250VDC
DIELECTRIC STRENGH: 250VAC/minute with leak current 5mA MAX
between coils; coil and head;
head and head housing; and
shield sheath and head.

⚠4					
⚠3					
⚠2					
⚠1					
⚠*					
⚠*					
HISTORY +COUNT	SUFFIX	88.12.26	本図許可願 REVISION	田中 SIGN	

UNIT mm | TOLERANCE STS-2 | USED ON

L≤ 4	±0.1
4<L≤ 16	±0.2
16<L≤ 63	±0.3
63<L≤250	±0.5
250<L	±0.8

ANGLE 3/4 | SCALE 1/1

ORIGINAL MODEL HA705LK-905

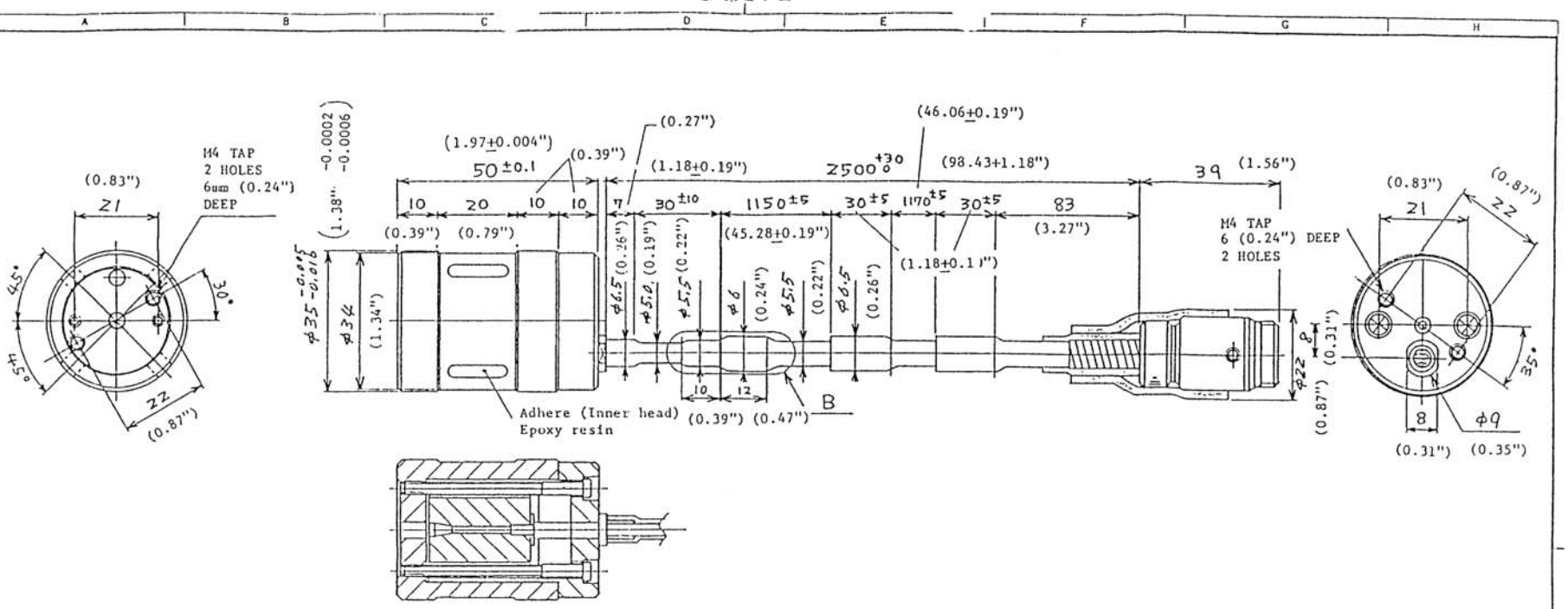
MATERIAL (COLOR) | FINISH (COLOR)

DESCRIPTION
(E)
(J) Outline Drawings

DRAWN BY	PLANNED BY	CHECKED BY	APPROVED BY	TENTATIVE	MODEL
12/9	12/9	88.12.9	12/9		PART NO. C-0628-050-1

PART NO. C-2903-455-1 | SHEET 1/1

SONY



Details B

Shield end treatment
1. 7-core cable
2.3. Heat-shrinkable Teflon tubing
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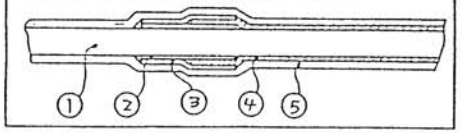

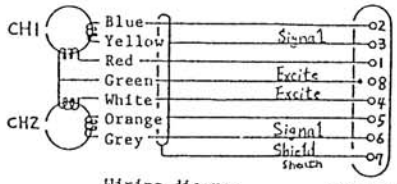

Wiring diagram Connector

ISOLATION RESISTANCE: 50MΩ MIN at 250VDC
DIELECTRIC STRENGH: 250VAC/minute with leak current 5mA MAX
between coils; coil and head;
head and head housing; and
shield sheath and head.

⚠×				
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HISTORY ACCOUNT	SYMBOL	ECN-NO.	REVISION	SIGN
	86/12/26		本図面登録	田中

DRAWN BY	PLANNED BY	CHECKED BY	APPROVED BY

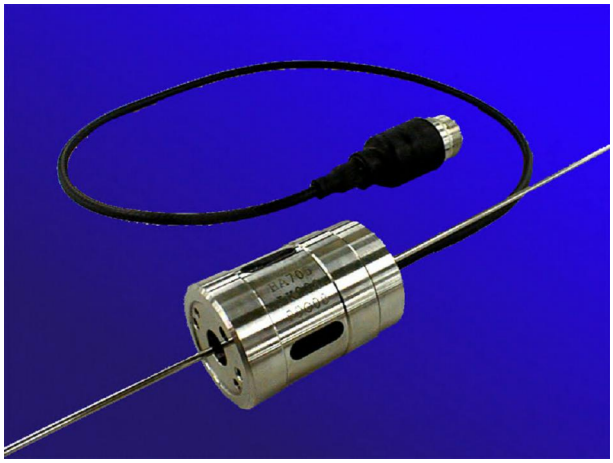
MODEL
PART NO. C-0628-050-1 TENTATIVE

unit mm | ANGLE 3rd | SCALE 1/1

TOLERANCE STS-2	
L≤ 4	±0.1
4<L≤ 16	±0.2
16<L≤ 63	±0.3
63<L≤250	±0.4
250<L	±0.6

USED ON
ORIGINAL MODEL HA705LK-905
MATERIAL (COLOR)
FINISH (COLOR)
DESCRIPTION
(1) Outline Drawings
PART NO. C-2903-455-1
SHEET 1/1

Head	Scale
HA-705LK	**MSS-976R**



-Excellent vibration resistance and waterproof head, guaranteed high reliability.

Head : HA-705LK

■ Waterproof performance equivalent to IP67.

■ Structure of excellent vibration resistance and shock resistance.

-Resist bad environment of rolling mill by water proof head developed only for it and excellent against harsh environment Magnescale.

-At tests done by our company, it has shock resistance which is 30 to 50G at acceleration and 110G or more at drop test (under our test condition).

■ Capable of extend with the cable only for it.

-Compliable with cable length up to max.150m

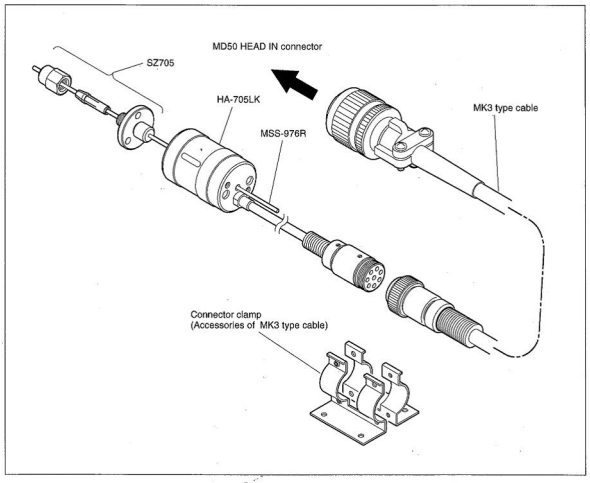
-Use material excellent for waterproof and oilproof

Scale rod : MSS-976R

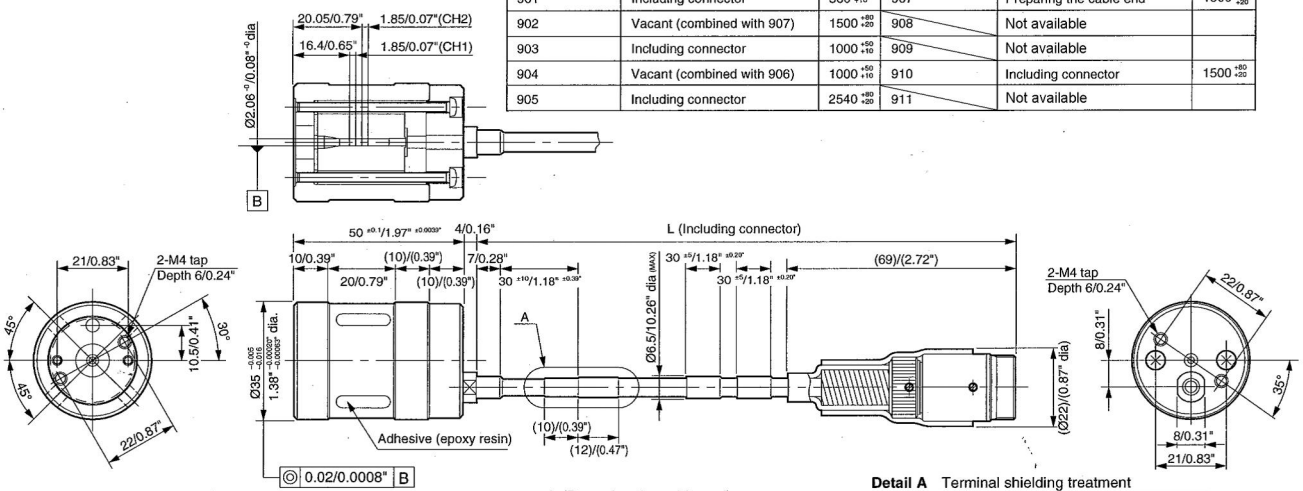
■ Accuracy : ±3μm

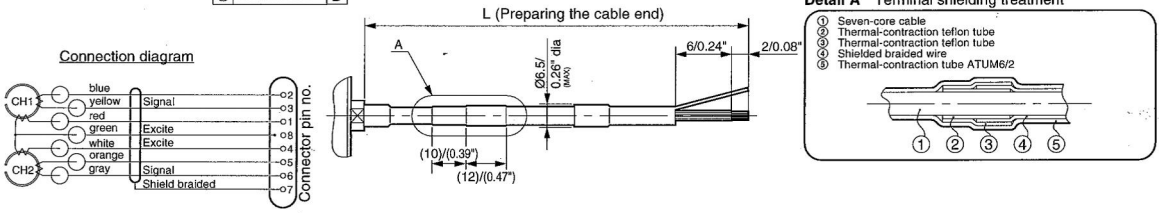
■ Measuring length : 200mm up to 600mm

(Overall length ; 30+ML+30 mm)



Special connection model	Cable terminal processing, description	L measurement	Special connection model	Cable terminal processing, description	L measurement
Standard	Preparing the cable end	500 +50 +10	906	Preparing the cable end	1000 +50 +10
901	Including connector	560 +50 +10	907	Preparing the cable end	1500 +50 +20
902	Vacant (combined with 907)	1500 +80 +20	908	Not available	
903	Including connector	1000 +50 +10	909	Not available	
904	Vacant (combined with 906)	1000 +50 +10	910	Including connector	1500 +80 +20
905	Including connector	2540 +80 +20	911	Not available	





Connection diagram

CH1	blue		-02
	yellow	Signal	-03
	red		-01
	green	Excite	-08
	white	Excite	-04
	orange		-05
CH2	gray	Signal	-06
		Shield braided	-07

Connector pin no.

Detail A Terminal shielding treatment

① Seven-core cable
② Thermal-contraction teflon tube
③ Thermal-contraction teflon tube
④ Shielded braided wire
⑤ Thermal-contraction tube ATUM6/2

Insulation resistance and insulation yield strength

There should be DC 250 V over at least 50 m and a one-minute leakage current of 5 mA or less at AC250 V between the coils, coil and head unit, head unit and housing, and shield and head unit.

Note

The connection section of the thermal-contraction tube ATUM6/2 for the cable does not have a designated location. (This is because the length varies depending on the contraction state.)