This GS describes the standard specifications, the standard scale graduations for point and process variable scales, and other items to be specified with orders of scales for YEWSERIES 80 panel instruments and YEWPACK ULDUs.

The indicators for YEWSERIES 80 instruments are available in moving coil versions and fluorescent bar graph versions.

The scales for SR VD recorders are also described.

The specifications which determine a scale mainly consist of the following items:

- **Scale Divisions**– Number of scale graduations, graduation interval (uniform graduations or square law graduations) line thickness and length, and line color.
- **Scale Marking** – Number of scale digits, signs (+, –), coefficient ($x10^n$), character style, size, and character color.
- **Engineering Units (Sign)** – Number of digits, character style, size, and character color.

Consideration should be given to scale readability and reading accuracy when specifying these items. For this company, the scale standard specifications are defined by the contents of this GS, and are based on JIS 28306 standard.

For the scale of instruments like YEWSERIES 80 controllers, where the scales for process variable and setpoint are usually the same, a scale with single set of divisions and a single set of marking is the standard. With the model SIHM-2, two independent process variable pointers are provided; with the Model SMRT, process variable pointer and set point (ratio) index have each separate scales. Hence two sets of graduations and two sets of scale markings in the standard.

SCALE TYPES AND APPLICABLE MODELS.

Moving Coil Indicator Scales:

SIHN, SIHM, SIHK, SLCD, SLPC, SLMC, SMLD, SMST, SMRT, ULDU.

Fluorescent Bar Graph Indicator Scales:

SIHF, SLCD, SLPC, SLMC, ULDU.

Recorder Scales: SRVD (Scale is not provided with the Model SRHD Intelligent Recorder).

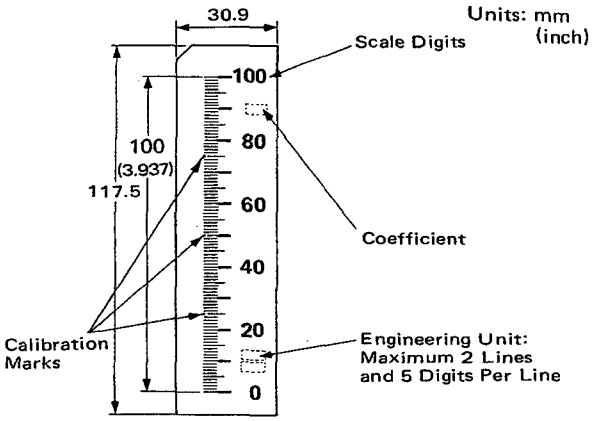


Figure 1. Scale Plates for Moving-Coil Indicators.

1. STANDARD SPECIFICATIONS FOR MOVING COIL INDICATOR SCALES.

1-1. External Specifications.

Scale Dimensions: Refer to Figure 1.

Scale Length: 100 mm. (3.937 inch)

Scale Materials: Transparent polyester film.

Number of Scale Digits: Three numeric digits (however, a fourth digit "1" is available for thousands. When decimal point is used, three digits are available).

Scale marking when decimal point is used should be three digits plus decimal point, as shown in the following example:

0, 0.02, 0.06, 0.10

└One digit may be used for zero.

Plus/Minus Sign: Generally, a minus (–) sign is entered for all negative numbers, but plus (+) sign is not used.

A minus sign is not counted in the number of scale digits.

Available Scale Digit Range: –1999 to –0.01 or 0.01 to 1999 and 0.

Position of Scale Marking: On the right-hand side of the main scale line (See Figure 2), with the scale line centered.

Coefficient: May be entered. Using nth power of 10 ($x10^n$), express the scale digit range within the number of scale digits so that it can be easily read. n is one digit.

For example, 0 to 100000 may be expressed by ① (0 to 10) x 10^4, ② (0 to 100) x 10^3 or ③ (0 to 1000) x 10^2. However, it is best to select the largest

number of scale digits possible and the smallest number for the exponent.

Engineering Units: 5 characters x 2 lines (up to 10 characters may be entered).

Character Height:

Scale Digit Marking Size: 4.5 mm (however, 3 mm for decimal fraction part)

Power of Ten: 3 mm (however, 2.4 mm for exponent part)

Engineering Unit (Sign): 3 mm (however, 2.4 mm for subscript characters)

Character Style: Similar to Helvetica medium (Yokogawa-Helvetica Medum).

Color for Scale Lines, Letters, Unit, and Coefficient: Black.

Calibration Marks: Calibration marks (•) are entered on the left-hand side of a scale lines at 25, 50 and 75% positions.

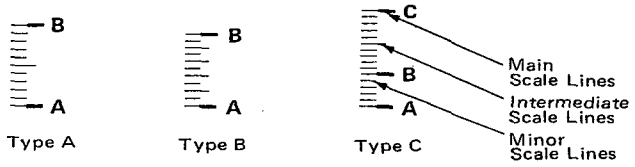


Figure 2. Scale Graduation Type.

1-2. Scale Graduation (Linear Scales).

Number of Scale Divisions: 50 to 100 divisions (Linear Scales).

The minimum graduation interval is 1 mm.

Assume that Scale Span (SPAN) = value at the scale 100% point – value at the scale 0% point.

then, for a SPAN of up to 100 but over 50, number of scale divisions equals the SPAN.

For other cases the scale range should be multiplied by 10, 100, 1/10 or 1/100 so that the scale span (SPAN) is greater than 100 but does not exceed 1000 ($100 < SPAN \leq 1000$) when the SPAN has been decided, the number of graduations and the graduation type are decided according to Table 1.

Table 1. Number of Graduations and Graduation Types.

	Number of Graduations	Graduation Types
$100 < SPAN \leq 200$	SPAN/ 2	Type A or Type C
$200 < SPAN \leq 500$	SPAN/ 5	Type B
$500 < SPAN \leq 1000$	SPAN/10	Type A or Type C

Scale Graduation Lines: Major scale lines, Intermediate scale lines and Minor scale lines.

For 0% and 100% scale lines, the major scale lines are used.

Scale Graduation Types: Three scale graduation types with different numbers of divisions and types of lines are available (See Figure 2).

Type A: Minimum scale value is 1, 2, 10^n or 2×10^n

Type B: Minimum scale value is 5, or 5×10^n

Type C: Minimum scale value is the same as for Type A and minor or intermediate scale lines are substituted for major scale lines.

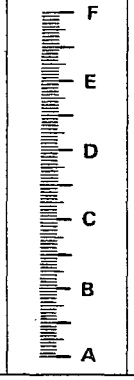
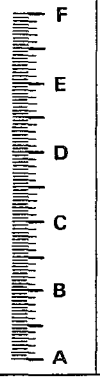
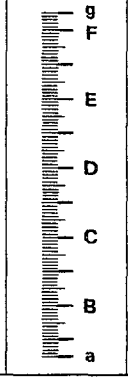
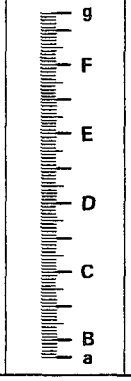
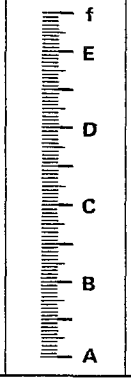
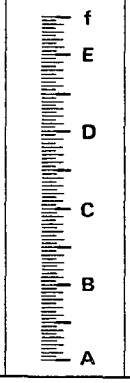
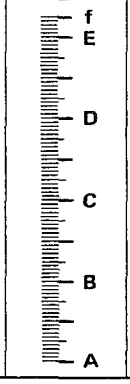
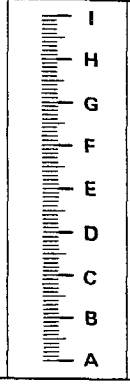
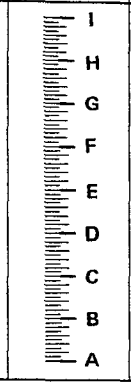
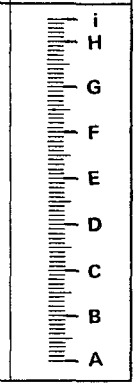
Correspondence between Scale Marking and Scale Graduation:

If number of scale divisions is less than 85, scale marking should be entered for each main scale line.

If number of scale divisions is 85 or more, scale marking should be entered for every second main scale division (For suppressed-zero scales which do not begin with 0, extend the scale range to contain 0 temporarily, and apply the conditions described above on the basis of this virtual zero point.)

Be sure to enter scale markings at zero and 100% points.

Scale Graduation Examples: See Figure 3.

Scale Range (example)	0 to 100 0 to 10 2 to 12 500 to 1500 −40 to 60	0 to 5 50 to 100 100 to 150 500 to 1000 −20 to 30	2.5 to 12.5	−50 to 150	0 to 9 0 to 900 0 to 1.8 0 to 1800	0 to 4.5 0 to 45 0 to 450	0 to 8.5 0 to 1.7 0 to 85	0 to 8 0 to 80 0 to 1.6 4 to 20 −30 to 50	0 to 4 0 to 400 1 to 5 10 to 50 −100 to 300	0 to 7.6 0 to 760
Number of Divisions	100	100	100	100	90	90	85	80	80	76
Scale Division Line Type	A	B	C	C	A	B	C	A	B	C
Scale Divisions Scale Digit Marking Entry Positions										

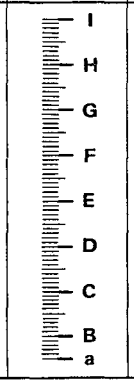
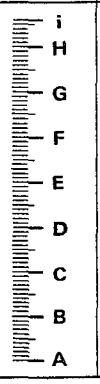
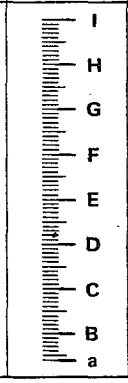
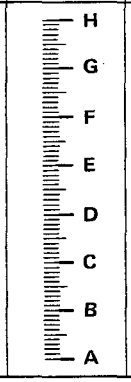
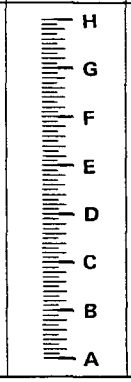
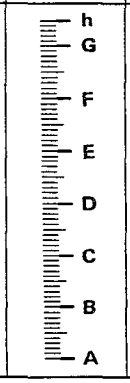
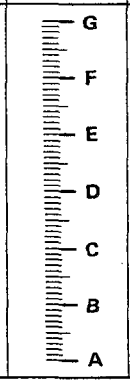
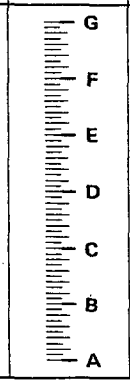
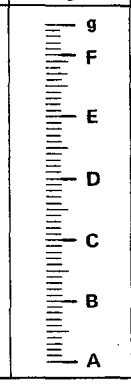
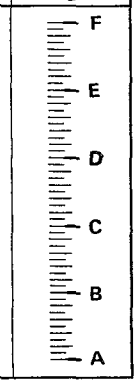
Scale Range (example)	−7.6 to 0 −760 to 0	0 to 1.5 0 to 150 0 to 7.5 10 to 25 100 to 250	5 to 20 50 to 200 −5 to 10 −50 to 100	0 to 7 0 to 700 0 to 1.4 500 to 1200 −20 to 50	0 to 3.5 0 to 350 −20 to 15 −200 to 150	0 to 1.3 0 to 6.5 0 to 65 0 to 1300	0 to 6 0 to 600 0 to 1.2 −3 to 3 −20 to 40	0 to 3 0 to 300 700 to 1000 −1 to 2 −15 to 15	0 to 1.1 0 to 5.5 0 to 11 0 to 55 0 to 1100	0 to 2.5 0 to 25 0 to 250 −50 to 200 −200 to 50
Number of Divisions	76	75	75	70	70	65	60	60	55	50
Scale Division Line Type	C	C	C	A	B	C	A	B	C	B
Scale Divisions Scale Digit Marking Entry Positions										

Figure 3. Standard Scale Division and Scale Marking Entry Positions for Moving-Coil Indicators (linear scales).

1-3. Scale Divisions (Square Law Scale).

Number of Scale Divisions, Scale Division Line Type and Correspondence between Scale Marking and Scale Division Lines:

Refer to Section 1-2. However, intermediate and minor scale lines may be omitted if graduation interval is 1 mm or less. Furthermore, when interval between main scale lines is 1.5 mm or less, the main scale lines may be omitted.

Scale Graduation Types: See Section 1-2.

Scale Range Limitation: The scale range whose 0% position is zero is of standard specifications, (0 to 10 Sq.rt. or 0 to 100 Sq.rt. scales are provided as standard, but 0.6 to 1.7 Sq.rt. or 10 to 50 Sq.rt. scales are not standard).

Scale Graduation Example: See Figure 4.

1-4. Two Sets of Scale Divisions (Standard for the Model SIHM-2 or Model SMRT).

Scale specifications for the left and right scales may be decided independently. With the Model SMRT, the left-hand side scale is for the process variable and the right-hand side scale is for the set point.

Scale Digit Height: 3.5 mm.

(however, other items are the same as section 1-1 External Specifications. Left-hand side scale digit entry positions are the same as for the right-hand side).

Scale Graduations: See Sections 1-2 and 1-3.

Calibration Marks: Indicates by interruptions in the vertical reference line (See Figure 5).

Scale Graduation Examples: See Figure 5.

Scale Range (example)	0 to 100 0 to 10 0 to 20	0 to 50 0 to 25	0 to 95 0 to 19	0 to 90 0 to 45 0 to 18	0 to 35 0 to 17	0 to 80 0 to 16	0 to 48	0 to 76	0 to 75 0 to 15	0 to 70 0 to 14
Number of Divisions	100	100	95	90	85	80	80	76	75	70
Scale Division Line Type	A	B	C	A	C	A	B	C	C	A
Scale Divisions Scale Digit Marking Entry Positions	E D C B A	E D C B A	e D C B A	e D C B A	G F E D C B A	H G F E D C B A	e D C B A	h G F E D C B A	h G F E D C B A	G F E D C B A

Scale Range (example)	0 to 65 0 to 13	0 to 60 0 to 12	0 to 30	0 to 55 0 to 11
Number of Divisions	65	60	60	55
Scale Division Line Type	C	A	B	C
Scale Divisions Scale Digit Marking Entry Positions	g F E D C B A	F E D C B A	F E D C B A	f E D C B A

Figure 4. Standard Scale Division and Scale Marking Entry Positions for Moving-Coil Indicators (square law scales).

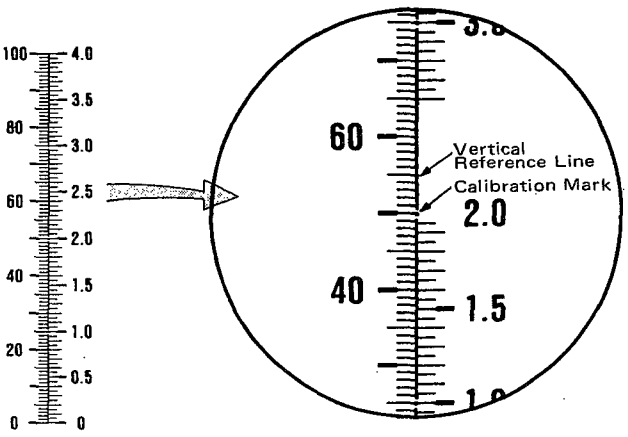


Figure 5. An Example of Two Sets of Scale Divisions.

2. STANDARD SPECIFICATIONS FOR FLUORESCENT BAR GRAPH INDICATOR SCALES.

2-1. External Specifications.

Scale Dimensions: Refer to Figure 6.

Scale Length: 100 mm. (3.937 inch)

Scale Materials and Ground Colors: Acrylic plate, green.

Number of Scale Digits, Scale Digit Sign and Available Scale Digit Range:

See Section 1-1. However, for units with digital display (SLCD or SLPC), in order for the scale digits to coincide with the digital display, the number of digits displayed at 0% and 100% points should be the most significant two digits and within the digital display range.

Scale Digit Entry Position: Enter scale digits with the main scale line auxiliary points centered on the scale.

Coefficient: See Section 1.1.

Engineering Units: 4 characters x 2 lines (up to eight characters may be entered).

Scale Digit Height: 4 mm (however, 3 mm for decimal fractions).

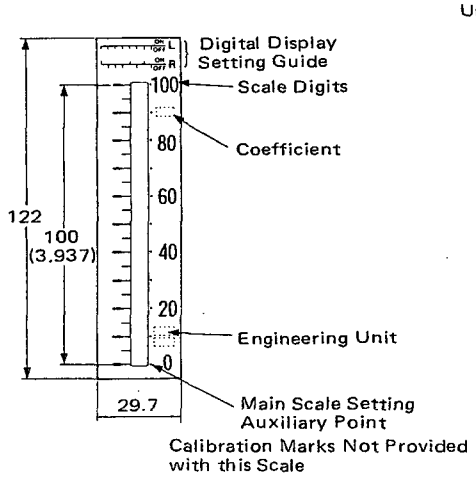


Figure 6. Scale Plates for Fluorescent Bar Graph Indicators.

Coefficient Digit and Unit Character (Sign) Height: See Section 1-1.

Character Style: See Section 1-1.

Color for Scale Lines, Letters, Units and Coefficient: White.

Digital Display Setting Guide: A 4-digit digital display is provided with fluorescent bar graph version of each Models SLCD, SLPC, SLMC and ULDU.

This digital display setting guide shows the scale digits corresponding to the digital display.

The 4-digit display sets the uppermost 2 digits of the values at 0% and 100% points in BINARY (lowermost 2 digits display 00). Hence, the scale marking at 0% and 100% positions should be specified by the most significant digits.

(e.g. +2500 can be set but −2500 or −250 cannot be set. See the following section).

Digital Display Range: −1999 to 4999.

(Using the maximum or minimum value within the display range effectively, when the value at 0% point is −200, digital value may be set to 199.9 and when the value at 100% point is 500, like as above, digital value may be set to 499.9.)

2-2. Scale Graduations (Linear Scales).

See Section 1-2.

However, for scales with 100 or 50 divisions, minor scale lines are omitted (See Figure 7).

Scale Range (example)	0 to 100 0 to 10 2 to 12 500 to 1500 −40 to 60	0 to 5 50 to 100 100 to 150 500 to 1000 −20 to 30	2.5 to 12.5 −50 to 150	0 to 2.5 0 to 25 0 to 250 −50 to 200 −200 to 50
Number of Divisions	100 → 20	100 → 50	100 → 20	50 → 25
Scale Division Line Style	A	B	C	B
Scale Divisions Scale Digit Marking Entry Positions	F E D C B A	F E D C B A	g F E D C B A	F E D C B A

Figure 7. Standard Scale Graduations and Scale Number Entry Positions for Bar-Graph Indicators (linear scales).

2.3. Scale Graduations (Linear Scale).

Square low scale on fluorescent bar graph indicator is available only for the SIHF indicator (See Section 1.3). With the models SLCD, SLPC, SLMC or ULDU, for signals with square law characteristic, bar graph indication and digital display will be different.

3. STANDARD SPECIFICATIONS FOR SRVD RECORDER SCALES.

Scale Dimensions: Refer to Figure 8.

Scale Length: 100 mm.

Scale Materials: Transparent polyester film.

Number of Scale Digits: Two numbers (however, a third digit "1" is available for hundreds. When decimal point is used, two digits are available).

Scale Digit Sign: See Section 1-1.

Available Scale Digit Range: −199 to −0.1 or 0.1 to 199 and 0.

Scale Digit Entering Position: On the right-hand side of the Main scale and on the left-hand side of the auxiliary scale; with the major scale division lines centered on the scale.

Coefficient: See Section 1-1.

Engineering Units: Three characters x two lines (up to 6 characters may be entered).
If number of characters exceeds this limit, see Figure 8 Entry example.

Scale Digit Height: 3.5 mm (however, 3 mm for decimal fractions).

Height of Scale Multiplier of Engineering Unit (Sign): See Section 1-1.

Character Style: See Section 1-1.

Color for Scale Lines, Letters, Unit and Scale Multiplier: Black.

Scale Graduations: See Sections 1-2 and 1-3.

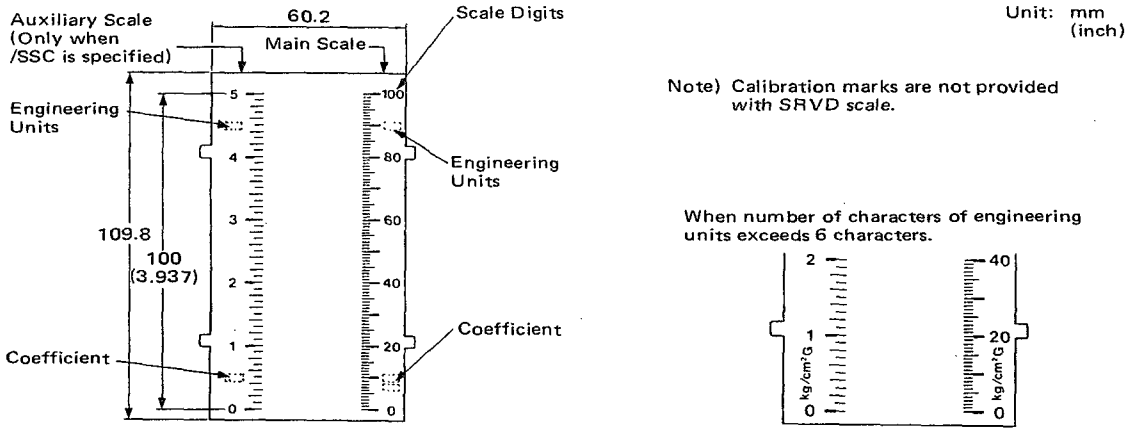


Figure 8. Scale Plates for SRVD Recorders.

With the SRVD 2-pen Recorder, considering scale display space and readability, we have designated a scale with single set of graduations and a single set of markings as the standard. If a different range scale is required with the SRVD, use an auxiliary scale plate (option code: /SSC) (See Figure 8).

ORDERING INSTRUCTIONS

1. If a scale plate is ordered together with an instrument, specify.
   - Scale range (within the standard scale graduations shown in Figure 3, 4 and 7), engineering units and coefficient (if required).
   - When ordering an auxiliary scale for the SRVD recorder, scale range of auxiliary scale (within the standard graduations shown in Figures 3 and 4), engineering unit and coefficient (if required).
2. If a scale plate is ordered separately.
   - Model and suffix codes.
   - Scale range (within the standard scale graduations shown in Figure 3, 4 and 7), engineering unit and coefficient (if required).
   - When ordering an auxiliary scale for the SRVD recorder, scale ranges for main and auxiliary scales (within the standard scale graduations shown in Figures 3 and 4) and engineering unit and coefficient (if required).