General Specifications

Model SMRT (Style E) Ratio Set Station

YEWSERIES 80

The SMRT Ratio Set Station is used in control systems in which two or more process variables must be held within a certain predetermined ratio. It has a broad range of application, such as flowrate ratio control and load distribution setting in boiler control.

- *A built-in microprocessor enables the SMRT Ratio Set Station to cover a wide range of ratios.*
- *A single SMRT model can support two different computational expressions.*
- *Coefficients can be easily set with the side-panel push-button switches.*
- *The SMRT Ratio Set Station can be used as a bias set station.*

STANDARD SPECIFICATIONS

Input/Output Signal

Analog Input Signals: 4.

Process variable signal	1 to 5V DC	Input resistance at least 1MΩ
Remote ratio set point signal		
External bias signal		
Output tracking control signal		

Input Conversion Accuracy: ±0.2% of span.

Analog Output Signals: 3.

Manipulated output signal	Current	4 to 20mA DC	Load resistance 0 to 750Ω
	Voltage	1 to 5V DC	Load resistance at least 2kΩ
Ratio set point signal		1 to 5V DC	Load resistance at least 2kΩ

Output Conversion Accuracy:

Current output, ±1.0% of span.

Voltage output, ±0.3% of span.

Status Input Signals: 2; instrument mode transfer, preset MV switching.

Input \ Internal input status		ON	OFF
No-Voltage contact or voltage contact	No-Voltage contact *	Contact closed—source resistance up to 200Ω	Contact open—source resistance of 100kΩ minimum
	Voltage contact**	Low: −0.5 to +1V	High: +4.5 to 30V

* Contact rating 5V DC, 20mA minimum.

** Minimum pulse width 220ms.

Status Output Signals: 4; process variable high/low limit alarms, (C, A)/M, C/(A, M) contact.

Transistor Contact Rating: 30V DC, 200mA (resistive load).

Fail Output Signal: 1.

Transistor Contact Rating: 30V DC, 200mA (resistive load).

Note: Analog I/O signals use a common negative line and are not isolated from control signals. Contact I/O signals are isolated from each other and other control signals as well as the power supply.

Indicating, Setting, and Operating Functions

Moving Coil Indicator: Dual index (red/blue).

Red Index: Process variable input or ratio value.

Blue Index: Ratio set point or internal bias set point.

Moving Coil Process Variable and Set Point Indicator:

Accuracy: ±0.5% of span.

Indicator Range: 0 to 100%.

Scale: 100mm.

Scale Graduation: Dual scale with units marking. Interchangeable. Major scale divisions are marked in bold.

Output Indicator: Moving coil type, with two memory indexes and valve open/close indexes.

Manipulated Output Indicator:

Accuracy: ±2.5% of span.

Scale: 39mm.

Scale Marking: 20 equal divisions.

Ratio Setting: Manual and remote setting.

Manual Setting: From front-panel SET button switches and turning panel. Variable to 40 sec./full scale.

Remote Setting: By remote ratio signals (in C mode only).

Mode Transfer: C mode (C)/Auto (A)/Manual (M). Front-panel mode selector switches (with built-in indicator lamps) and external status inputs effect instrument mode transfers between these three modes.

C: Ratio computation is executed by remote ratio set point signals, or ratio set points and manipulated output values are altered from a supervisory computer.

A: Ratios are set from front-panel SET button switches or a turning panel for computation.

M: Output is manipulated with a manual control lever.

Outputs During Mode Transfers:

C → A: Balanceless, bumpless transfer possible.

C, A → M: Balanceless, bumpless transfer possible.

M → A: Follow-up transfer with a ramp constant (DL)*1 (without ratio tracking*2 and bias tracking*3). Balanceless, bumpless transfer (with ratio tracking and bias tracking).

A → C: Follow-up transfer with a ramp constant (DL).

Notes:

*1: Ramp constant: A constant with ramp follow-up control to avert abrupt changes in output during ratio set point change and mode transfer.

*2: Ratio tracking: Calculates a ratio from the prevailing output when in M (manual) mode and loads this value as the ratio set point.

*3: Bias tracking: Calculates a bias P3 (see Computational Functions) from the prevailing output when in M (manual) mode and loads this value as a bias value.

Mode transfer by Status Input:

Any of the following mode transfers can be executed by status selecting input and MODE selection:

Operation	Operation mode	Status input	
		Mode transfer	
		Closed	Open
External CAS / AUTO ⟷ MAN	C, A	–	M
	M	–	–
External CAS ⟷ AUTO	C	–	AUTO
	A, M	–	–
Output tracking	C, A	–	tracking
	M	–	–
Preset MV output *1	C, A,	–	Preset MV
	M	–	–

Note: *1 Mode transfer may be executed when the preset MV selection input is closed.

Note: 2 In the above table, "–" mark shows that the corresponding function is disabled.

Mode Status Output:

Mode	C	A	M
C/(A, M) contact	Closed	Open	Open
(C, A)/M contact	Closed	Closed	Open

Manual Output: Set by two-speed lever action.

SLOW: 40 sec./full scale.

FAST: 4 sec./full scale.

Computational Functions

Ratio Expressions:

Computational Expression A: MV = SVn (PV + P1) + P4 (EB + P2) + P3

Computational Expression B: MV = SVn {(PV + P1) + P4 (EB + P2)} + P3

where,

MV: manipulated variable

PV: process variable

EB: external bias

SVn: internally computed ratio

P1 to P4: computational parameters

Ratio Setting:

Range: The high limit (SRH) and the low limit (SRL) of SVn can be set in the range from 0.000 to 8.000. However, SRH and SRL must satisfy the relationship SRH − SRL ≧ 0.1.

Set Point Limits: The high limit SH and the low limit SL for the engineering unit ratio set point SV can be set.

Bias and Coefficients:

P1, P2, P3: Set range −800.0 to +800.0%.

P4: Set range −800.0 to +800.0%.

Signal Conditioning Computations

Computational functions may be selected, and computational parameters set, using side panel keys.

Square Root with Low-Signal Cutoff: Used for process variable or external bias input. For signals below the "cutoff" point (adjustable between 0.0 and 100.0), a linear characteristic "Output = Input" applies.

Ten-Segment Line-Segment Function: Ten equi-spaced input break points; corresponding outputs may be set in the range 0.0 to 100.0. Applies to process variable input.

Input Filters: Can be applied to process variable input, remote ratio setpoint input, output tracking input, and external bias input. First order lag time constant may be set in the range 0.0 to 799.9 sec.

Process Variable High/Low Alarms (PH, PL): Process variable (PV) input high/low limit alarms. With any of above input processing functions selected, these alarms are issued depending on the results of the processing.

Output Processing Functions:

Squared Output: Computed ratio values can be squared and output. A squared output can be selected/deselected from the tuning panel.

Velocity Limit (VL): Sets maximum rate change in output value if the computed ratio output undergoes a sudden large change. This value can be set anywhere in the range 0 to 100%/sec.

Output Limits (MH, ML): The high and low limits for ratio output can be set in the range −6.3 to 106.3%.

Alarm Functions

Alarm Actions: Process variable high/low limit alarms, ratio set point limit alarm.

Output Contacts: One each for high and low limit alarms (No ratio set point limit alarm output). An open or closed alarm contact can be selected from the tuning panel. Contact open during power failure.

Alarm Indication: Front-panel "ALM" lamp.

Communication Functions

The SMRT can communicate (via LCS card in field control station/unit) with a central YEWPACK/CENTUM CRT-display operator station. Maximum length of (SCCD) cable to LCS card is 100 m (328 ft).

For LCS Card Interface to YEWPACK/CENTUM:

Data Transmitted: Process variable, ratio set point, manipulated output, instrument mode, ratio computational value, ramp constant output limits, computational parameters (P01 to P04), external bias.

Cascade Mode: Cascade signal can be local or remote (transmitted from a supervisory computer).

DDC/SPC Mode: Remote setting of manipulated output in DDC mode, or set point in SPC mode.

Backup Mode Selection: If the communications or supervisory computer systems fail, the YewSeries 80 system reverts to backup mode. Either auto or manual backup modes can be selected using side panel keys.

Power-Fail/Restart Functions

Power Failure Less Than Approximately 2 Sec.: Computational data and status prior to power failure is retained.

Power Failure for 2 sec. and Longer: HOT or COLD restart, selected via the tuning panel.

(Note)

HOT: Status prior to power failure is retained.

COLD: Status is reset to manual mode; manipulated output is restarted from the low limit. Same as HOT restart in all other respects.

Data Memory Backup During Power Failure: Internal battery.

Backup Battery Life (temperatures up to 45°C):

At least 5 years (normal operation).

At least 1 year (active backup operation).

Self-Diagnostic Features

A/D and D/A Converter and Microprocessor Abnormalities: "FAIL" lamp lights. "FAIL" contact output opens. ("FAIL" contact output also opens during power failure.) Manual control available during failure. Process variable is indicated on the front panel (red index).

Computing Range Overflow, Input Signal Range Overflow, Current Output Wire Open Circuit or Overload, Initialized Start for Loss of Internal Data: "ALM" lamp lights for each of these conditions.

Memory Backup Battery Low: "ALM" lamp flashes on and off.

(Note)

Error codes for the items above are indicated on the side tuning panel.

Communications Abnormality: "C" lamp flashes on and off (during communications) only in computer mode.

Normal Operating Conditions

Ambient Temperature: 0 to 50°C (32 to 122°F).

Ambient Humidity: 5 to 90% relative humidity (non-condensing).

Power Supply: Two versions, for "100 V" (standard) or "220 V" (option /A2ER). Both versions may use AC or DC, without change to the instrument:

Version	100 V	220 V
DC (polarity reversible)	20 to 130 V	120 to 340 V
AC (47 to 63 Hz)	80 to 138 V	138 to 264 V

Maximum Power Consumption:

	24 V DC	100 V AC	220 V AC
SMRT	340 mA	16 VA	20.0 VA

Insulation Resistance:

Between I/O Terminals and Ground: 100 MΩ at 500 V DC.

Between Power and Ground: 100 MΩ at 500 V DC.

Dielectric Strength:

Between I/O Terminals and Ground: 500 V AC for 1 minute.

Between Power and Ground:

1000 V AC for 1 minute (100 V version).

1500 V AC for 1 minute (220 V version).

Wiring:

Signal Wiring to/from the Field: ISO M4 size (4 mm) screws on terminal block.

Power and Ground Wiring:

100 V Version: JIS C8303 two-pin plug with earthing contact. (IEC A5-15, UL498).

220 V Version: CEE 7 VII (CENELEC standard) plug.

Cable Length: 300 mm (11.8 in).

Mounting

Mounting: Flush panel mounting. Instruments are in housings, and can be mounted either separately or side-by-side. Instrument may be inclined up to 75° from vertical (rear of instrument lower than front). (Indicator zero may require readjustment.)

Nameplate: Size 8 × 63.5 mm, cream-colored semi-gloss finish with one or two rows of black letters each containing up to 14 alphanumeric characters.

Front Panel Finish: Dark green (Munsell 2.5GY 3/1).

Housing: Open type, with SPBD standby manual control station connector.

Bezel: Aluminium diecast, black baked-enamel finish.

Housing Dimensions: 182.5 (H) × 87 (W) × 480 (D: depth behind panel surface) (mm) (7.2 × 3.4 × 18.9 in).

Weight:

Station without Housing: 3.4 kg (7.5 lb).

Housing: 2 kg (4.4 lb) (excluding mounting kit).

OPTIONS

/A2ER: For "220 V version" power supply.

/MTS: Station supplied with kit for separate mounting.

/SCF-G□M: Mounting kit bezel color change from standard color (black). Choose color from set of optional colors (see GS 22D1F1-E). Specify color code in the box □.

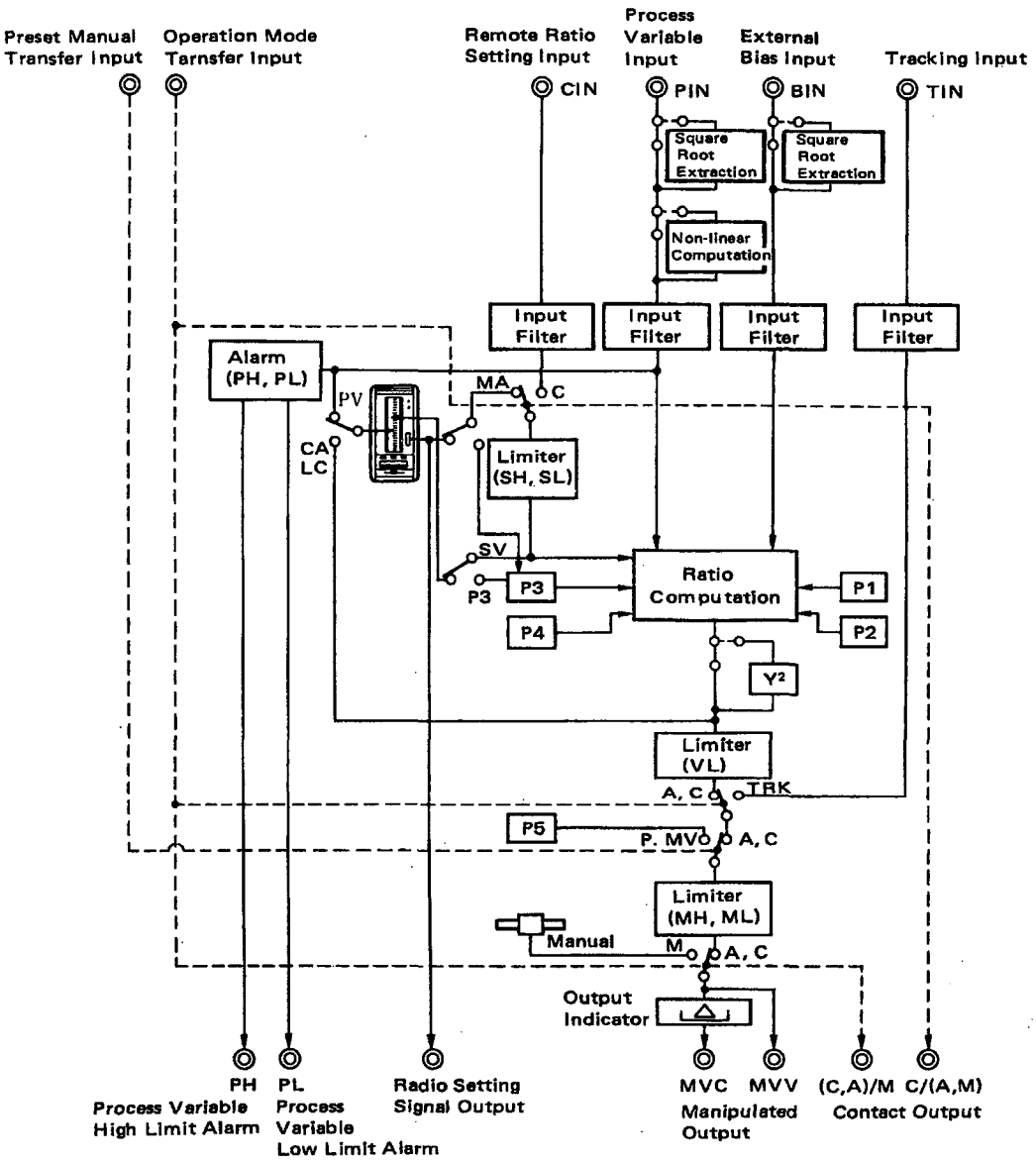
/NHS: No housing with instrument. See GS 1B4F1-E to order housing separately.

/NPE: Engraved front-panel nameplate.

SPARE PARTS SUPPLIED

Fuse: 1 A, quantity one.

Labels to Record Tuning Data: Two sheets.



SMRT Functional Block Diagram

MODEL AND SUFFIX CODES

Model	Suffix Codes		Description
SMRT	.....		Ratio Set Station
Process Variable Indicator	-1		With process variable indicator
Function	4		Enhanced type
	0		Always 0
Style code	*E		Style E
Common options		/A2ER	220V power supply*
		/MTS	With mounting kit
		/SCF	Bezel color change
		-G□M	
		/NHS	Without housing
		/NPE	With engraved nameplate

* When ordering housing separately, specify /A2/NHS.

TERMINAL CONNECTIONS

Terminal Designation	Description	Terminal Designation	Description
1	+	17	+
2	− Process variable input (1 to 5V DC)	18	− Communications*1
3	+	19	+
4	− Remote ratio set point input (1 to 5V DC)	20	− (C, A)/M contact output
5	+	21	− Fail output (negative terminal)
6	− Tracking input (1 to 5V DC)	A	+
7	+	B	− Manipulated output (4 to 20mA DC) *2
8	− External bias input (1 to 5V DC)	C	+
9		D	− Manipulated output (1 to 5V DC)
10		F	+
11	+	H	− Ratio set point signal output (1 to 5V DC)
12	− Mode transfer input	J	+
13	+	K	− Process variable high limit alarm output
14	− Preset MV transfer input	L	+
15	+	M	− Process variable low limit alarm output
16	− C/(A, M) contact output	N	+ Fail output (positive terminal)

Notes: *1: Use shielded twisted-pair cable (SCCD, see GS 34B6T1-01E).
*2: Jumper these pins when out of service.

======== ORDERING INSTRUCTIONS ========

When ordering, specify the following:
1. Model, suffix and option codes.
2. Main scale and engineering units marking for process input indicator (see GS 22D1C1-E).
3. Nameplate marking, if required (option /NPE).
4. Mounting kit (option /MTS), if the instrument is to be mounted separately.

========= RELATED INSTRUMENT =========

Related Instruments

Model UFCH Field Control Unit GS34B6G1-01E
Model CFCS2 Field Control Station ..... GS 34B2G1-01E
Model CFCD Duplexed Field Control Station ..... GS 34B2H1-01E
Model SCCD Cable ..... GS 34B6T1-01E

Related Spare Parts

Memory Backup Battery ..... Part no. E9711DH