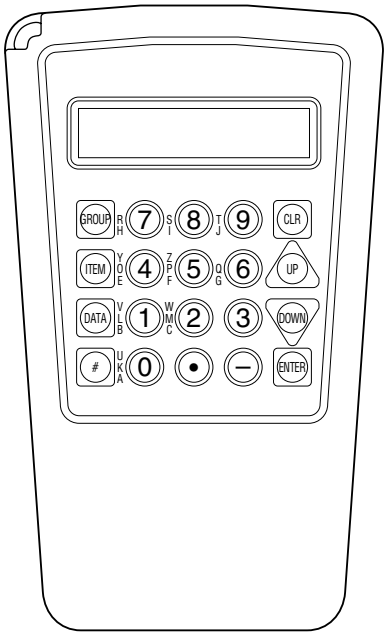
PROGRAMMING UNIT
FOR JX SERIES TRANSMITTERS
Model: PU-2A

OPERATION MANUAL



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SECTION A. JX Series Field Programmable Signal Conditioners

FUNCTION	SERIES									
	M-UNIT	M-RACK	F-UNIT	H-UNIT	H-RACK	10-RACK	18(K)-RACK	11-RACK	W-UNIT	W-RACK
DC INPUT (ISOLATOR)	JV	7JV	FJV	HJV	GJV	10JV	18(K)JV	11JV	WJV	VJV
THERMOCOUPLE	JT	7JT	FJT	HJT	GJT	10JT	18(K)JT	11JT	WJT	VJT
3-wire RTD	JR	7JR	FJR	HJR	GJR	10JR	18(K)JR	11JR	WJR	VJR
4-wire RTD	—	—	—	—	—	10JRE	—	—	—	—
POTENTIOMETER	JM	7JM	FJM	HJM	GJM	10JM	18(K)JM	11JM	WJM	VJM
FREQUENCY	JPA	7JPA	FJPA	HJPA	GJPA	10JPA	18(K)JPA	11JPA	WJPA	VJPA
SELF-SYNCH	JS	7JS	—	—	—	—	—	—	WJS	VJS
SQUARE ROOT EXTRACTOR	—	—	—	—	—	—	18JN	—	—	—
CURRENT LOOP SUPPLY	—	—	—	—	—	—	18(K)JDN	—	—	—
CURRENT LOOP SUPPLY	JDL	7JDL	FJDL	HJDL	GJDL	10JDL	18(K)JDL	11JDL	—	—
LINEARIZER	JFX	7JFX	FJFX	HJFX	GJFX	10JFX	18JFX	11JFX	WJFX	VJFX
100-point LINEARIZER	JFX1	—	—	—	—	—	—	—	—	—
2-input MATH	JF	7JF	FJF	HJF	GJF	10JF	18JF	11JF	WJF	VJF
3-input MATH	JFK	7JFK	—	—	—	—	—	11JFK	WJFK	VJFK
FILTER/LAG, 8-point	JFT	7JFT	FJFT	HJFT	GJFT	10JFT	18JFT	11JFT	WJFT	VJFT
FILTER/LAG, 100-point	JFTS	—	—	—	—	—	—	—	—	—
ANALOG BACKUP	JB	—	—	—	—	—	—	—	—	—
3-input MIDDLE SELECTOR	JFKM	—	—	—	—	—	—	—	—	—

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SECTION B. JX Series Field Programmable Pulse Transmitters

FUNCTION	SERIES	
	M-UNIT	W-UNIT
FREQUENCY TO DC	JPAD	WJPAD
PULSE ACCUMULATOR	JPQD	
ENCODER SPEED	JRPD	
ENCODER POSITION	JRQD	
DC TO 2-PHASE PULSE	JARP	
DC TO FREQUENCY	JAPD	
PULSE SCALER	JPRD	
PULSE ADDER	JPSM	
FREQUENCY SCALER	JFRD	

See descriptions on JPAD for WJPAD.

The Model PU-2A is used for those our products other than listed here. Instructions for them are issued separately for each particular model.

Thank you for choosing us. Before starting, please make sure of the following:

PACKAGE INCLUDES:

- Programming Unit..... 1
- Connection Cable..... 1
- This Operation Manual..... 1

THIS OPERATION MANUAL CONSISTS OF:

Two sections:
Section A. JX series Field Programmable Signal Conditioners;
Section B. JX series Field Programmable Pulse Transmitters.

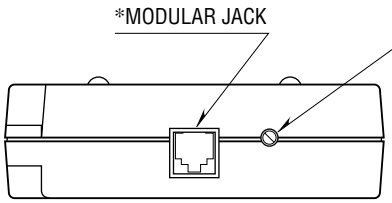
PROGRAMMING METHODS FOR EACH SECTION ARE LARGELY DIFFERENT. READ CAREFULLY THE PROPER SECTION OF THIS MANUAL BEFORE PROGRAMMING.

The Model PU-2A is used for those our products other than listed on the cover page of this manual. Instructions for them are issued separately for each particular model.

■ CAUTIONS !

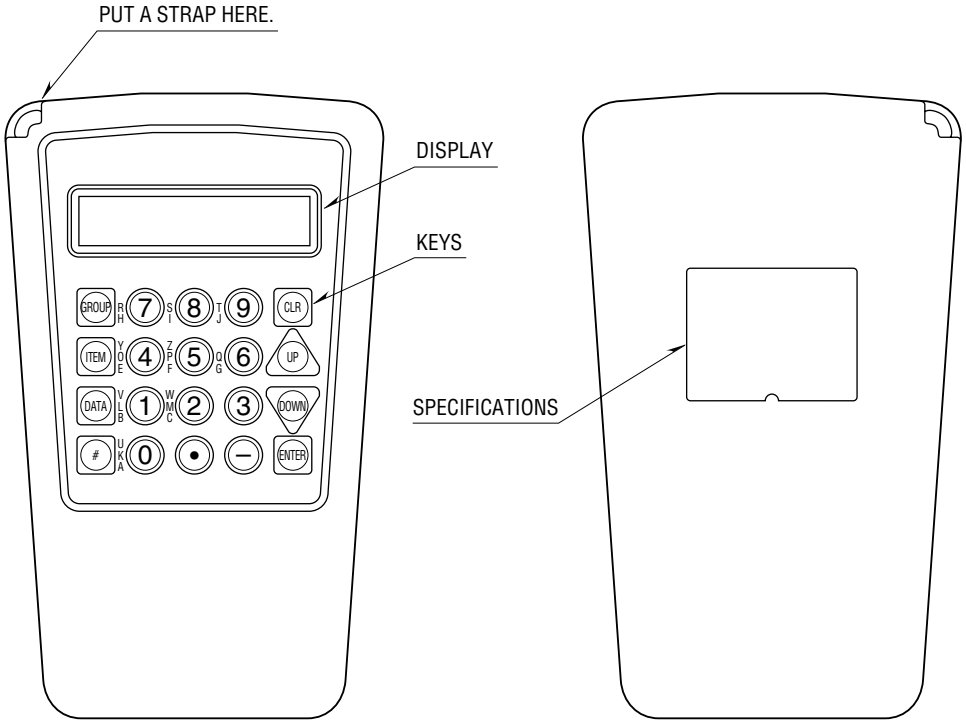
- Hold the PU-2A securely in your hand when programming.
  Never hang the PU-2A unit by the connection cable. Vibration and physical impact by dropping the PU-2A could cause malfunction of the unit.
- Quick change of ambient temperature and humidity, from low temp. place to high temp. and humidity, could cause condensation, which may destroy electronic circuitry in the PU-2A.
- Use the PU-2A in ambient temperature: 0 – 45°C.

■ COMPONENT IDENTIFICATION

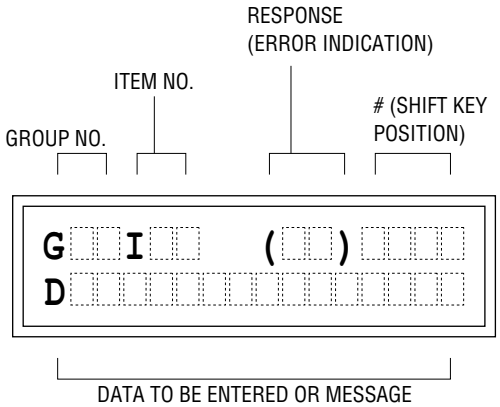


TOP VIEW

*CONNECTION CABLE IS PROVIDED.



FRONT VIEW **REAR VIEW**



DISPLAY RESPONSE MESSAGE

OK : O. K.
NG : NO GOOD
NU : NOT USED
ER : ERROR

SHIFT KEY

Used for entering alphabetics. Shift indication changes as #0, #1, #2, #3, #0 ..... every time the key is pressed. Level #0 is for entering numbers, and levels #1 to #3 indicate the position of the alphabets from the bottom at the left of number entry keys.

SECTION A.
JX Series Field Programmable Signal Conditioners

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A-1. INTRODUCTION

The fundamental procedures required for configuring input data of the JX series field programmable signal conditioners are explained in this section. In order to do this, the Model PU-2A programming unit is required.
Each function is easily programmable via the PU-2A keyboard by selecting a specific number ([DATA] entry for each [ITEM]) from the table of the specific unit function. The operator need only understand the meaning of each [ITEM] in order to program the unit. No special programming skills or software is required.
There is specific terminology associated with the PU-2A programming unit. The table categories are called [GROUP], which define whether the data is common for many types of transmitters or inherent for each transmitter model. Each group has several [ITEM] numbers, each of which shows what is to be programmed or monitored. [DATA] is the specific input value or percentage to be adjusted. The PU-2A programming unit's operations are based on these three levels: [GROUP] – [ITEM] – [DATA].

A-2. GENERAL OPERATION DESCRIPTION

■ DESCRIPTION

• When You Want to Monitor the Transmitter Status in Operation:

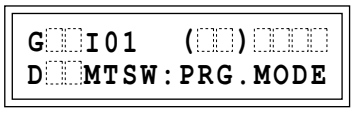
1) **Be sure that the power is supplied to the transmitter.**
2) Connect the PU-2A to the transmitter via the front modular jack.
3) Specify an item to be monitored.
   Press [GROUP] NN [ITEM] NN. (N = number entry keys)
4) Specify another item if necessary. Repeat (2).
5) Disconnect the PU-2A.

• When You Want to Change Parameters:

1) **Be sure that the power is supplied to the transmitter.**
2) Connect the PU-2A to the transmitter via the front modular jack.
3) Switch the transmitter into PROGRAM mode with PU-2A.
4) Specify an item to be changed.
   Press [GROUP] NN [ITEM] NN [DATA] N (NNN....) [ENTER] (N = number entry keys)
5) Specify another item if necessary. Repeat (3).
6) Disconnect the PU-2A.

■ MAINTENANCE SWITCH & OPERATION MODES

There are two operation modes for JX signal conditioners: MONITOR mode and PROGRAM mode. You use the Maintenance Switch, lock command to prevent unauthorized access to specific data, for changing the operation mode.
In MONITOR mode, the signal conditioner is in normal operation, measuring, computing and outputting signals. You can only monitor parameter settings, measuring result, output status but cannot affect the transmitter's operation. No parameter change except for the Maintenance Switch is available.
In PROGRAM mode, the transmitter stops measuring and renewing the output signal. The output signal is held, but you can output a specific value for simulation and testing purposes. Parameter settings can be changed.
For changing to the PROGRAM mode, key in [ITEM] 01 [DATA] 1 [ENTER].
The display will appear as shown to the right:



When all the program changes are completed, disconnect the PU-2A. The Maintenance Switch automatically defaults to "0" (lock position)*.
Do not turn on/off the power supply to the transmitter while the PU-2A is connected. All memory will be lost if power is removed.

* For those models applicable to Section B, it is necessary to change the Maintenance Switch to MONITOR mode after programming. All modification data will be lost if you unplug the PU-2A before returning to MONITOR mode. Read Section B.

■ NG MESSAGE

When there are errors in data entries, the PU-2A display indicates "NG". Confirm the input data. Do not leave any items in "NG" status, especially ITEM 10. If ITEM 10 is in "NG" status, all other ITEMs become unavailable. Be sure to go through checking all ITEMs after ITEM 10 data entry.

■ OUTPUT SIMULATION PROGRAMMING

The output signal of the transmitter is held while in the PROGRAM mode, but you can output a specific value for simulation and testing purposes. Press [GROUP] 01 [ITEM] 03 [DATA] (desired output value) [ENTER]. The output value changes in accordance with further adjustments with other [ITEM]s.

• EXAMPLE: 50% output simulated for 1 – 5 V output range.

1 – 5 V range is converted into percentage against 0 – 5 V range with ITEM 3: 20 – 100%.

1) **Be sure that the power is supplied to the transmitter.**
2) Connect the PU-2A to the transmitter via the front modular jack.
3) Press [GROUP] 01 [DATA] 1 [ENTER].
4) Press [ITEM] 03 [DATA] 50 [ENTER].
5) Specify another group, item and data to cancel the simulated output.
6) Disconnect the PU-2A. (The simulated output is automatically cancelled.)

■ ROM VERSION INDICATION

PROGRAMMING UNIT

When the Programming Unit is connected with a JX transmitter (GROUP and ITEM indications are empty), press [#] 99 and display indicates the ROM version No. of the Programming Unit.

JX TRANSMITTER

Press [GROUP] 00 [ITEM] 99, and display indicates the ROM version No. of the transmitter.

A-3. GENERAL OPERATION FLOW CHART

Be sure that power is supplied to the transmitter.

Connect the PU-2A to the modular jack on the front of transmitter.
Driving power for the PU-2A is supplied from the transmitter.

WARNING!!
DO NOT TURN ON/OFF POWER SUPPLY TO THE TRANSMITTER WHILE THE PU-2A IS CONNECTED. ALL MEMORY WILL BE LOST IF POWER IS REMOVED.

INITIAL STATE

The transmitter output signal is held when the PU-2A is connected. It tracks the input signal only when the input or output monitor command is entered.

Press [GROUP] [x]

Press [ITEM] [x]
(x: number 0 to 99)

GROUP NO. and ITEM NO. indication is clear.
- [GROUP] 00 : System Table. Clearing the data in the ROM. Used when erasing segment data for a linearizer module.
- [GROUP] 01 : Used for entering input data for each transmitter. Each table (GROUP) has a MAINTENANCE SWITCH ([ITEM] 01, lock command) to prevent unauthorized access to specific data.
- [ITEM] 01 [DATA] 0 : The transmitter input and output can be monitored but cannot be programmed. (display message = MTSW: MON.MODE)
- [ITEM] 01 [DATA] 1 : The transmitter can now be programmed. (display message = MTSW: PRG.MODE)

DATA INDICATION

To change the ITEM NO., press [ITEM] and then the number or press the [UP] or [DOWN] key one or more times.

[DATA] [x] ...

DATA INPUT

Press [DATA] and then the number required. When a wrong number is typed, start again with the [DATA] key and input the correct number.
The display goes back to the data indication state when [CLEAR] is pressed.

[ENTER]

ENTER DATA COMMAND

Press [ENTER] to enter the data into the ROM. Programmed data is again indicated on the display for confirmation.
Then proceed to the next ITEM NO. (Press [ITEM] and then the number and repeat from Data Indication state.)

DISCONNECT THE PU-2A

The transmitter output starts tracking the input signal.
The MAINTENANCE SWITCH automatically defaults to “0” (lock position).
DO NOT TURN ON/OFF THE POWER SUPPLY TO THE TRANSMITTER WHILE THE PU-2A IS CONNECTED. ALL MEMORY WILL BE LOST IF POWER IS REMOVED.

A-4. INPUT/OUTPUT PROGRAMMING FLOW CHART

The JX transmitters process data using an internal digital operation circuit.
The following chart shows a typical input data programming procedure which covers Data Indication, Data Input to Enter Data Command has been explained on the previous page.

ITEM 10 - 11	**INPUT RANGE ADJUSTMENT**

Refer to Section A-5 for the specific DATA NO. for each input type.

Type in the thermocouple type, RTD type or potentiometer value.
For DC input units, first type [ITEM] 10 which specifies the type of transmitter and then type [ITEM] 11 which is used to set the coarse range.

ITEM 12 - 13	**INPUT ZERO/SPAN ADJUSTMENTS**

THESE ARE FACTORY SETTING ITEMS ONLY. They cannot be adjusted by the operator.

ITEM 14 - 15	**SCALING**

See Section A-5. GROUP 01 TABLE.

Zero and fullscale value adj. (fine adj.) Type in the actual values for 0% and 100% input.

ITEM 60 - 91	**LINEARIZATION DATA INPUT**

See Section A-5. LINEARIZATION DATA TABLE.

Used for the JX Linearizer units only.
[GROUP] 01 for Models xJM, 10JRE, xJPA, xJS, xJDL and xJFX, and [GROUP] 02 & 03 for Model JFX1.

ITEM 19 - 20	**FINE ZERO/SPAN ADJUSTMENTS**

Type in a percentage value for the ZERO and SPAN adjustments.

ITEM 16 - 17	**OUTPUT ZERO/SPAN ADJUSTMENTS**

THESE ARE FACTORY SETTING ITEMS ONLY. They cannot be adjusted by the operator.

A-5. GROUP 01 TABLE FOR EACH INPUT TYPE

In the tables, each MDFY. (modification) mark indicates:

D: No modification (writing) possible. Used only for monitoring (reading).

S: Modifiable at any time.

P: Modifiable only when the MAINTENANCE SWITCH is in the "PRG" mode.

■ DC INPUT (ISOLATOR) model xJV (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
05	D	No input	INPPER XXX.XX	Input status monitor (%) *1
06	D	No input	INPVAL XXX.XX	Input status monitor in actual value, same unit as selected in ITEM 10.
10				TYPE OF TRANSMITTER INPUT *2
	D	11	mV-1: 5 – 100mV	
	D	12	mV-2: 0.05 – 1V	
	P	13	mV-3: 0.5 – 10V	
	P	14	mV-6: 1 – 5V	
	D	15	mV-A: 4 – 20mA	
	D	16	mV-H: 10 – 50mA	
11	P			COARSE INPUT RANGE SELECTION

		mV-1 (± mV)	mV-2 (± V)	mV-3 (± V)	mV-6/A/H
0	INPRNG: XXXX	5	0.05	0.5	No Adjustment Needed
1	INPRNG: XXXX	10	0.10	1.0	
2	INPRNG: XXXX	20	0.20	2.0	
3	INPRNG: XXXX	50	0.50	5.0	
4	INPRNG: XXXX	100	1.00	10.0	

14	P	Actual value	SCLLOW XXXXXX	Input range scaling 0% value
15	P	Actual value	SCLHIG XXXXXX	Input range scaling 100% value Use the same engineering unit as the coarse range selected in ITEM 11.
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.

REMARK 1 : Percentage of the coarse input range selected in ITEM 11.

(Example)	SCALED RANGE	COARSE RANGE	INPUT	DISPLAY
	1 – 5 V	0 – 5 V	1 V	20%
	0 – 10 V	0 – 10 V	0 V	0%
	-5 – +5 V	-5 – +5 V	0 V	0%
	-5 – +5 V	-5 – +5 V	-5 V	-100%

REMARK 2 : Data 13 and 14 are selectable without needing to make hardware change. In order to get 4 – 20 mA or 10 – 50 mA input, attach a precision resistor to input terminals.

■ THERMOCOUPLE INPUT model xJT (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
04	D	No input	OUTTMP XXXX.XX	Output temperature monitor *1
05	D	No input	INPPER XXX.XX	Input status monitor (%) *2
06	D	No input	INPVAL XXXXXX	Input status monitor in mV
07	D	No input	CJMTMP XXX.XX	Cold junction compensation temperature (°C)
10	P			TYPE OF THERMOCOUPLE
		1	Tc-1: (PR)	(PR)
		2	Tc-2: K (CA)	K (CA)
		3	Tc-3: E (CRC)	E (CRC)
		4	Tc-4: J (IC)	J (IC)
		5	Tc-5: T (CC)	T (CC)
		6	Tc-6: B (RH)	B (RH)
		7	Tc-7: R	R
		8	Tc-8: S	S
		9	Tc-9: WRe 5-26	WRe 5-26
		0	Tc-0: N	N
14	P	Actual value	SCLLOW XXXXXX	Input range scaling 0% value
15	P	Actual value	SCLHIG XXXXXX	Input range scaling 100% value Use the same temp. unit as selected in ITEM 21.
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.
21	P			TEMPERATURE SCALE
		0	TMPSCL: [°C]	Program ITEM 21 first before ITEM 14/15 when °F or K calibration is needed. This procedure is necessary whenever thermocouple type is changed.
		1	TMPSCL: [°F]	
		2	TMPSCL: [K]	

REMARK 1 : Temperature is indicated in the unit selected in ITEM 21.

REMARK 2 : Percentage of the input range without zero scaling (0 to upper-range value).

(Example)	SCALED RANGE	COARSE RANGE	INPUT	DISPLAY
	100 – 1000°C	0 – 1000°C	200°C	20%

■ 3-wire RTD INPUT model xJR (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
04	D	No input	OUTTMP XXXXXX	Output temperature monitor *1
06	D	No input	INPVAL XXXXXX	Input status monitor in Ω.
10				TYPE OF RTD
	P	31	RB-1: Pt 100	Pt 100 (JIS '89)
	P	32	RB-2: JPt 100	JPt 100 (JIS '89)
	D	33	RB-3: Pt 50	Pt 50 Ω (JIS '81)
	D	34	RB-4: Ni 508.4	Ni 508.4 Ω
	P	36	RB-6: Pt 100_97	Pt 100 (JIS '97, IEC)
14	P	Actual value	SCLLOW XXXXXX	Input range scaling 0% value
15	P	Actual value	SCLHIG XXXXXX	Input range scaling 100% value Use the same temp. unit as selected in ITEM 21.
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.
21	P			TEMPERATURE SCALE
		0	TMPSCL: [°C]	Program ITEM 21 first before ITEM 14 when °F or K calibration
		1	TMPSCL: [°F]	is needed. This procedure is necessary whenever thermocouple
		2	TMPSCL: [K]	type is changed.

REMARK 1 : Temperature is indicated in the unit selected in ITEM 21.

■ POTENTIOMETER INPUT model xJM (Group 01)

4-wire RTD INPUT model 10JRE (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
05	D	No input	INPPER XXX.XX	Input status monitor (%) *1
10	P			LINEARIZATION
		41	Pm-1: straight	Without
		42	Pm-2: curved	With (ITEM 60 to 91 for data input) *2
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.

REMARK 1 : Percentage of the total resistance

REMARK 2 : See LINEARIZER model xJFX table for detailed explanation on curve data programming (ITEM 60 to 91). You can also specify output percentage for unused resistance range by the linearization table.

■ FREQUENCY INPUT model xJPA (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
05	D	No input	INPPER XXX.XX	Input status monitor (%) *1
06	D	No input	INPFRQ XXXXXX	Input frequency monitor, same unit as selected in ITEM 11
10	P			LINEARIZATION
		1	PA-1: straight	Without
		2	PA-2: curved	With (ITEM 60 to 91 for data input) *2
11	P			COARSE FREQUENCY RANGE SELECTION
		0	FRQRNG: 10mHz	0 – 10 mHz
		1	FRQRNG: 100mHz	0 – 100 mHz
		2	FRQRNG: 1.0Hz	0 – 1 Hz
		3	FRQRNG: 10Hz	0 – 10 Hz
		4	FRQRNG: 100Hz	0 – 100 Hz
		5	FRQRNG: 1.0kHz	0 – 1 kHz
		6	FRQRNG: 10kHz	0 – 10 kHz
		7	FRQRNG: 100kHz	0 – 100 kHz
13	P	Percentage	DRPOUT XXX.XX	Low-end cutout adjustment, 0.00 – 100.00%
14	P	Actual value	SCLLOW XXXXXX	Input range scaling 0% value
15	P	Actual value	SCLHIG XXXXXX	Input range scaling 100% value Up to 150% of the coarse range selected in ITEM 11. Use the same unit.
18	P	Number	SMPLRATE XXX	Sampling rate modification for irregular pulse input (No. of pulses to be counted during one rotation of input flowmeter) Frequency range ≤ 100 Hz: 1 – 255 Frequency range 0 – 1 kHz: 1 – 25 Frequency range 0 – 10 kHz: 1 – 2
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.

REMARK 1 : Percentage of the coarse input range selected in ITEM 11.

(Example)	SCALED RANGE	COARSE RANGE	INPUT	DISPLAY
	10 – 100 Hz	0 – 100 Hz	10 Hz	10%

REMARK 2 : See LINEARIZER model xJFX table for detailed explanation on curve data programming (ITEM 60 to 91).

■ **SELF-SYNCH INPUT model xJS (Group 01)**

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
04	D	No input	OUTANG XXX.XX	Output angle monitor (degree)
05	D	No input	INPANG XXX.XX	Input angle monitor (degree)
06	D	No input	XVALUE XXX.XX	X-axis monitor (voltage: V)
07	D	No input	YVALUE XXX.XX	Y-axis monitor (voltage: V)
08	D	No input	INPOFS XXX.XX	Input offset setting monitor (degree)
10	P			LINEARIZATION *1
		1	SR-1: straight	Without
		2	SR-2: curved	With (ITEM 60 to 91 for data input) *2
14	P	Actual value	ANGOFS XXX.X	Input offset angle (0%, degrees) *3
15	P	Actual value	ANGRNG XXX.X	Input range scaling (100%, degrees) *3
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.

REMARK 1 : After setting ITEM 10, following ITEMs are reset to the default value.

ITEM 14 (Angle offset): 0.0
ITEM 15 (Angle range): 360.0
ITEM 19 (Zero fine adjustment): 0.00
ITEM 20 (Span fine adjustment): 100.00

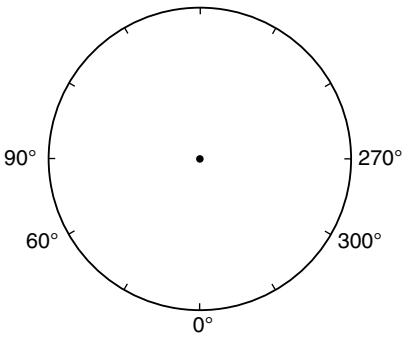
REMARK 2 : See LINEARIZER model xJFX table for detailed explanation on curve data programming (ITEM 60 to 91).

REMARK 3 : After setting ITEM 14 or 15, it is required to perform offset adjustment for the xJS unit, which can be conducted with the multi-turn screwdriver adjustment over the modular jack of the unit.

TYPICAL SET-UP PROCEDURE

CALIBRATION EXAMPLE

0% input = 60 degrees 0% output = 0 mA
100% input = 300 degrees 100% output = 1 mA



PROCEDURE

1) Apply an input signal which corresponds to 60 degrees.
2) Adjust the potentiometer on the xJS unit (located above the modular phone jack) until the output reading is exactly 0 mA DC (0%).
3) Apply an input signal which corresponds to 240 degrees.
4) Adjust [ITEM] 20 (FINSPN) until the output reading is exactly 1 mA DC (100%).
5) Apply 0% input and check that the output is exactly 0 mA DC. If yes, then the unit is calibrated properly.
6) If not, then adjust [ITEM] 19 until the output is exactly 0 mA DC.
7) Repeat steps 3) – 6) until there is no change in 0% and 100% readings.

■ SQUARE ROOT EXTRACTOR model 18JN (Group 01)

sq. root extracting CURRENT LOOP SUPPLY model 18xJDN(Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
05	D	No input	INPPER XXX.XX	Input status monitor (%)
10	P	41	Sq-1: Nodrop	Square root output, without low-end cutout
		42	Sq-2: Dropout	Square root output, with low-end cutout
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.

■ LINEARIZING CURRENT LOOP SUPPLY model xJDL (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
04	D	No input	OUTTMP XXXX.XX	Output temperature monitor *1
05	D	No input	INPPER XXX.XX	Input status monitor (%) *2
06	D	No input	INPVAL XXXXXX	Input status monitor in mV
10	P			TYPE OF LINEARIZATION
		1	Tc-1: (PR)	Thermocouple (PR)
		2	Tc-2: K (CA)	K (CA)
		3	Tc-3: E (CRC)	E (CRC)
		4	Tc-4: J (IC)	J (IC)
		5	Tc-5: T (CC)	T (CC)
		6	Tc-6: B (RH)	B (RH)
		7	Tc-7: R	R
		8	Tc-8: S	S
		9	Tc-9: WRe 5-26	WRe 5-26
		11	PS: Straight	Proportional output
		21	FX: Linearizer	Segment data linearization *3
		31	RB-1: Pt 100	RTD Pt 100 (JIS '97, IEC, JIS '89)
		32	RB-2: JPt 100	JPt 100 (JIS '89)
		33	RB-3: Pt 50	Pt 50 Ω (JIS '81)
		34	RB-4: Ni 508.4	Ni 508.4 Ω
		41	Sq-1: Nodrop	Square root output, without low-end cutout
		42	Sq-2: Dropout	Square root output, with low-end cutout
14	P	Actual value	SCLLOW XXXXXX	Temperature range scaling 0% value *1
15	P	Actual value	SCLHIG XXXXXX	Temperature range scaling 100% value *1
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.
21	P			TEMPERATURE SCALE
		0	TMPSCL: [°C]	Program ITEM 21 first before ITEM 14/15 when °F or K calibration is needed. This procedure is necessary whenever thermocouple or RTD type is changed.
		1	TMPSCL: [°F]	
		2	TMPSCL: [K]	

REMARK 1 : Applicable to temperature signal only. Use the same unit as selected in ITEM 21.

REMARK 2 : Percentage of the range 0 – 20 mA

REMARK 3 : See LINEARIZER model xJFX table for detailed explanation on curve data programming (ITEM 60 to 91).

■ **LINEARIZER model xJFX (Group 01)**

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
05	D	No input	INPPER XXX.XX	Input status monitor (%) *1
06	D	No input	INPVAL XXX.XX	Input status monitor in actual value, same unit as selected in ITEM 10.
10				TYPE OF TRANSMITTER INPUT *2
	D	21	Fx-1: 5 – 100mV	
	D	22	Fx-2: 0.05 – 1V	
	P	23	Fx-3: 0.5 – 10V	
	P	24	Fx-6: 1 – 5V	
	D	25	Fx-A: 4 – 20mA	
	D	26	Fx-H: 10 – 50mA	
11	P			COARSE INPUT RANGE SELECTION

		Fx-1 (± mV)	Fx-2 (± V)	Fx-3 (± V)	Fx-6/A/H
0	INPRNG: XXXX	5	0.05	0.5	No Adjustment Needed
1	INPRNG: XXXX	10	0.10	1.0	
2	INPRNG: XXXX	20	0.20	2.0	
3	INPRNG: XXXX	50	0.50	5.0	
4	INPRNG: XXXX	100	1.00	10.0	

14	P	Actual value	SCLLOW XXXXXX	Input range scaling 0% value
15	P	Actual value	SCLHIG XXXXXX	Input range scaling 100% value Use the same engineering unit as the coarse range selected in ITEM 11.
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.

REMARK 1 : Percentage of the coarse input range selected in ITEM 11.

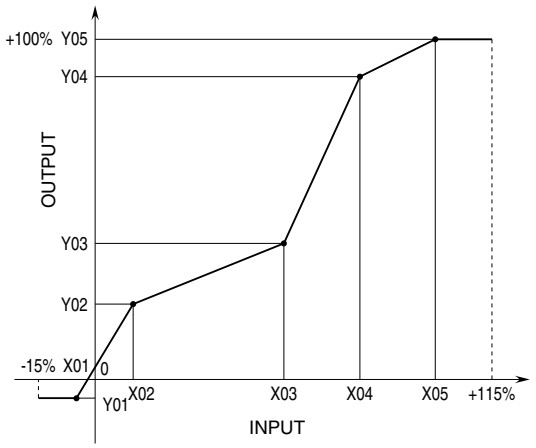
(Example)	SCALED RANGE	COARSE RANGE	INPUT	DISPLAY
	1 – 5 V	0 – 5 V	1 V	20%
	0 – 10 V	0 – 10 V	0 V	0%
	-5 – +5 V	-5 – +5 V	0 V	0%
	-5 – +5 V	-5 – +5 V	-5 V	-100%

REMARK 2 : Data 23 and 24 are selectable without needing to make hardware change. In order to get 4 – 20 mA or 10 – 50 mA input, attach a precision resistor to input terminals.

HOW TO PROGRAM SEGMENT DATA FOR LINEARIZATION ....

Non-linear input and their corresponding output values are entered as a percentage of the full range (span). Input any number of points from 2 to 16 starting from ITEM 60 in order from the smallest input (X) value. The operational range is from -15 to +115% of the programmed range.

1) Set 1st point of linearization (input).
2) Press [ITEM] 60 [DATA] [x] ... [ENTER] :
3) Set 1st point of linearization (output).
4) Press [ITEM] 61 [DATA] [x] ... [ENTER] :
5) Repeat the above procedure for all necessary linearization points.



ITEM	MDFY.	DISPLAY E.G.	CONTENTS	ITEM	MDFY.	DISPLAY E.G.	CONTENTS
60	P	X (01): XXX.XX	Input 1	76	P	X (09): XXX.XX	Input 9
61	P	Y (01): XXX.XX	Output 1	77	P	Y (09): XXX.XX	Output 9
62	P	X (02): XXX.XX	Input 2	78	P	X (10): XXX.XX	Input 10
63	P	Y (02): XXX.XX	Output 2	79	P	Y (10): XXX.XX	Output 10
64	P	X (03): XXX.XX	Input 3	80	P	X (11): XXX.XX	Input 11
65	P	Y (03): XXX.XX	Output 3	81	P	Y (11): XXX.XX	Output 11
66	P	X (04): XXX.XX	Input 4	82	P	X (12): XXX.XX	Input 12
67	P	Y (04): XXX.XX	Output 4	83	P	Y (12): XXX.XX	Output 12
68	P	X (05): XXX.XX	Input 5	84	P	X (13): XXX.XX	Input 13
69	P	Y (05): XXX.XX	Output 5	85	P	Y (13): XXX.XX	Output 13
70	P	X (06): XXX.XX	Input 6	86	P	X (14): XXX.XX	Input 14
71	P	Y (06): XXX.XX	Output 6	87	P	Y (14): XXX.XX	Output 14
72	P	X (07): XXX.XX	Input 7	88	P	X (15): XXX.XX	Input 15
73	P	Y (07): XXX.XX	Output 7	89	P	Y (15): XXX.XX	Output 15
74	P	X (08): XXX.XX	Input 8	90	P	X (16): XXX.XX	Input 16
75	P	Y (08): XXX.XX	Output 8	91	P	Y (16): XXX.XX	Output 16

■ **100-point LINEARIZER model JFX1 (Group 01)**

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG : XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
05	D	No input	INPPER XXX.XX	Input status monitor (%)
10	D	1	1: LINEARIZER	Multi-point linearizer
11	P			LINEARIZATION
		0	LNR NO OPT	Without (proportional output)
		1	LNR OPTION	With (default setting)
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.

HOW TO PROGRAM SEGMENT DATA FOR LINEARIZATION (JFX1) ....

Non-linear input and their corresponding output values are entered as a percentage of the full range (span). Input any number of points from 2 to 100 starting from GROUP 02 ITEM 00 in order from the smallest input (X) value. The operational range is from -15 to +115% of the programmed range.

(Group 02)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
00	P	Percentage	X (00): XXX.XX	Input 0 (Linearization point 1)
01	P	Percentage	Y (00): XXX.XX	Output 0 (Linearization point 1)
:	:	:	:	: :
98	P	Percentage	X (49): XXX.XX	Input 49 (Linearization point 50)
99	P	Percentage	Y (49): XXX.XX	Output 49 (Linearization point 50)

(Group 03)

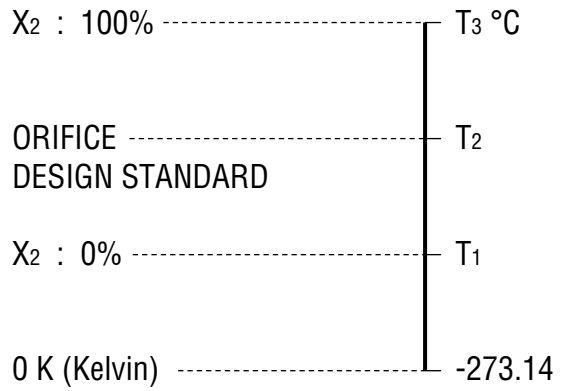
ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
00	P	Percentage	X (50): XXX.XX	Input 50 (Linearization point 51)
01	P	Percentage	Y (50): XXX.XX	Output 50 (Linearization point 51)
:	:	:	:	: :
98	P	Percentage	X (99): XXX.XX	Input 99 (Linearization point 100)
99	P	Percentage	Y (99): XXX.XX	Output 99 (Linearization point 100)

■ 2-input MATH FUNCTION model xJF (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
04	D	No input	INPER1 XXX.XX	X_1: Input 1 status monitor (%) *1
05	D	No input	INPER2 XXX.XX	X_2: Input 2 status monitor (%) *1
06	D	No input	(X0) XXX.XXXX	X_0: Normalization parameter monitor (1.0000=100%)
07	D	No input	(X1) X.XXXX	X_1: Normalization parameter monitor (1.0000=100%)
08	D	No input	(X2) X.XXXX	X_2: Normalization parameter monitor (1.0000=100%)
10	P			TYPE OF EQUATION
		1	01: X1 / SQR (X2)	Temp. compensation for DP flowmeter $X_0 = \frac{K_1X_1}{\sqrt{K_2X_2 + A_2}}$ X_1 = flow, X_2 = temp.
		2	02: X1 * SQR (X2)	Press. compensation for DP flowmeter $X_0 = K_1X_1\sqrt{K_2X_2 + A_2}$ X_1 = flow, X_2 = press.
		3	03: X1 + X2	Addition & Subtraction $X_0 = K_0 \{K_1(X_1 + A_1) + K2(X_2 + A_2)\} + A_0$
		4	04: X1 * X2	Multiplication $X_0 = K_0 (K_1X_1 + A_1)(K_2X_2 + A_2) + A_0$
		5	05: X1 / X2	Division $X_0 = \frac{K_0 (K_1X_1 + A_1)}{K_2X_2 + A_2} + A_0$
11	P			SQUARE ROOT EXTRACTION FOR INPUT X_1
		0	SQR NO OPTION	Without
		1	SQR OPTION	With
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.
21	P	Number	(K0) XX.XXX	Gain K_0 (1.000 = 100%)
22	P	Number	(K1) XX.XXX	Gain K_1 (1.000 = 100%)
23	P	Number	(K2) XX.XXX	Gain K_2 (1.000 = 100%)
24	P	Number (%)	(A0) XXX.XX	Bias A_0 (%)
25	P	Number (%)	(A1) XXX.XX	Bias A_1 (%)
26	P	Number (%)	(A2) XXX.XX	Bias A_2 (%)
27	P	Number (%)	X1LMTL XXX.XX	Input LOW limit X_1 (-25.00 – +125.00%)
28	P	Number (%)	X2LMTL XXX.XX	Input LOW limit X_2 (-25.00 – +125.00%)
29	P	Number (%)	X1LMTH XXX.XX	Input HIGH limit X_1 (-25.00 – +125.00%)
30	P	Number (%)	X2LMTH XXX.XX	Input HIGH limit X_2 (-25.00 – +125.00%)

REMARK 1 : Percentage of the input range without zero suppression (0 – 5 V, 0 – 20 mA).

TEMPERATURE COMPENSATION FOR DP FLOWMETER



K_1 = I/O range scaling factor

K_1 = 1 when input & output ranges are identical.

$$K_2 = \frac{T_3 - T_1}{T_2 + 273.14} \qquad A_2 = \frac{T_1 + 273.14}{T_2 + 273.14}$$

[EXAMPLE]

Temp. range of DP flowmeter: 0 – 400°C
Design standard of orifice: 300°C

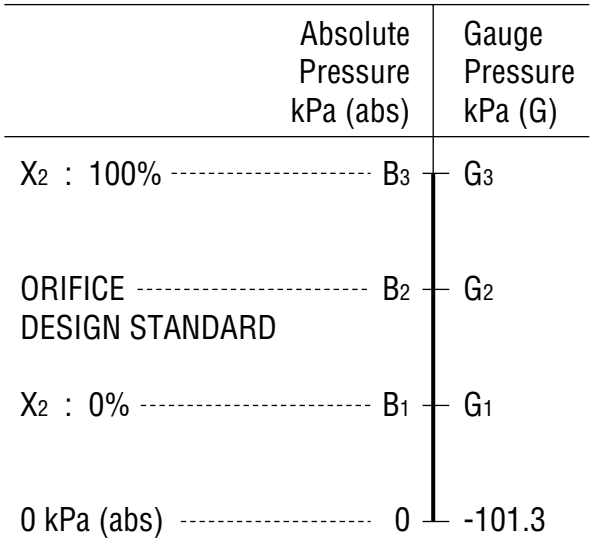
K_1 = 1

$$K_2 = \frac{400 - 0}{300 + 273.14} = 0.698$$

$$A_2 = \frac{0 + 273.14}{300 + 273.14} = 0.4766 \quad = 47.66\%$$

PRESSURE COMPENSATION FOR DP FLOWMETER

Atmospheric pressure = 101.3 kPa (abs)



• Absolute Pressure

$$K_2 = \frac{B_3 - B_1}{B_2} \qquad A_2 = \frac{B_1}{B_2}$$

• Gauge Pressure

$$K_2 = \frac{G_3 - G_1}{G_2 + 101.3} \qquad A_2 = \frac{G_1 + 101.3}{G_2 + 101.3}$$

[EXAMPLE]

Press. range of DP flowmeter: 0 – 980 kPa (G)
Design standard of orifice: 686 kPa (G)

K_1 = 1

$$K_2 = \frac{980 - 0}{686 + 101.3} = 1.245$$

$$A_2 = \frac{0 + 101.3}{686 + 101.3} = 0.1287 \quad = 12.87\%$$

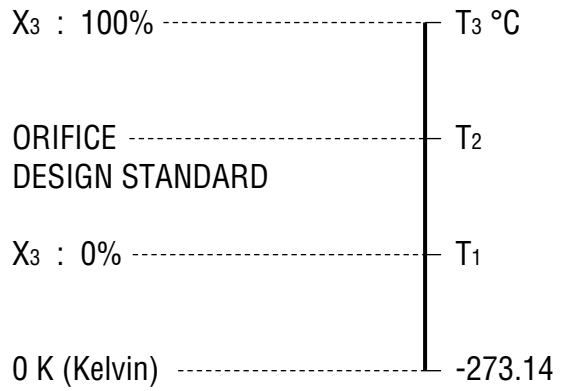
■ **3-input MATH FUNCTION model xJFK (Group 01)**

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
04	D	No input	INPER1 XXX.XX	X_1: Input 1 status monitor (%) *1
05	D	No input	INPER2 XXX.XX	X_2: Input 2 status monitor (%) *1
06	D	No input	INPER3 XXX.XX	X_3: Input 3 status monitor (%) *1
07	D	No input	(X0) XXX.XXXX	X_0: Normalization parameter monitor (1.0000=100%)
10	P			TYPE OF EQUATION
		1	X1 * SQR (X2 / X3)	Temp. & press. compensation for DP flowmeter $X_0 = K_1X_1\sqrt{\frac{K_2X_2 + A_2}{K_3X_3 + A_3}}$ where X_1 = flow, X_2 = pressure, X_3 = temperature. Specify ITEM 11 square root extraction for a square input X_1.
		2	X1 + X2 + X3	Addition & Subtraction $X_0 = K_0\{K_1(X_1 + A_1) + K_2(X_2 + A_2) + K_3(X_3 + A_3)\} + A_0$
		3	X1 * X2 * X3	Multiplication $X_0 = K_0(K_1X_1 + A_1)(K_2X_2 + A_2)(K_3X_3 + A_3) + A_0$
		4	(X1 * X2) / X3	Multiplication & Division $X_0 = \frac{K_0(K_1X_1 + A_1)(K_2X_2 + A_2)}{K_3X_3 + A_3} + A_0$
		5	X1 / (X2 * X3)	Multiplication & Division $X_0 = \frac{K_0(K_1X_1 + A_1)}{(K_2X_2 + A_2)(K_3X_3 + A_3)} + A_0$
		6	(X1 + X2) * X3	Addition & Multiplication $X_0 = K_0(K_1X_1 + K_2X_2 + A_1)(K_3X_3 + A_3) + A_0$
		7	(X1 + X2) / X3	Addition & Division $X_0 = \frac{K_0(K_1X_1 + K_2X_2 + A_1)}{(K_3X_3 + A_3)} + A_0$
		8	X1 / (X2 + X3)	Division & Addition $X_0 = \frac{K_0(K_1X_1 + A_1)}{(K_2X_2 + K_3X_3 + A_2)} + A_0$
		9	X1 + (X2 * X3)	Addition & Multiplication $X_0 = K_0(K_1X_1 + A_1) + K_0(K_2X_2 + A_2)(K_3X_3 + A_3) + A_0$
		10	X1 + (X2 / X3)	Addition & Division $X_0 = K_0(K_1X_1 + A_1) + \frac{K_0(K_2X_2 + A_2)}{(K_3X_3 + A_3)} + A_0$
11	P			SQUARE ROOT EXTRACTION FOR INPUT X_1
		0	SQR NO OPTION	Without
		1	SQR OPTION	With
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
21	P	Number	(K0) XX.XXX	Gain K_0 (1.000 = 100%)
22	P	Number	(K1) XX.XXX	Gain K_1 (1.000 = 100%)
23	P	Number	(K2) XX.XXX	Gain K_2 (1.000 = 100%)
24	P	Number	(K3) XX.XXX	Gain K_3 (1.000 = 100%)
25	P	Number (%)	(A0) XXX.XX	Bias A_0 (%)
26	P	Number (%)	(A1) XXX.XX	Bias A_1 (%)
27	P	Number (%)	(A2) XXX.XX	Bias A_2 (%)
28	P	Number (%)	(A3) XXX.XX	Bias A_3 (%)
29	P	Number (%)	X1LMTL XXX.XX	Input LOW limit X_1 (-25.00 – +125.00%)
30	P	Number (%)	X2LMTL XXX.XX	Input LOW limit X_2 (-25.00 – +125.00%)
31	P	Number (%)	X3LMTL XXX.XX	Input LOW limit X_3 (-25.00 – +125.00%)
32	P	Number (%)	X1LMTH XXX.XX	Input HIGH limit X_1 (-25.00 – +125.00%)
33	P	Number (%)	X2LMTH XXX.XX	Input HIGH limit X_2 (-25.00 – +125.00%)
34	P	Number (%)	X3LMTH XXX.XX	Input HIGH limit X_3 (-25.00 – +125.00%)

REMARK 1 : Percentage of the input range without zero suppression (0 – 5 V, 0 – 20 mA).

TEMPERATURE COMPENSATION FOR DP FLOWMETER



K_1 = I/O range scaling factor

K_1 = 1 when input & output ranges are identical.

$$K_3 = \frac{T_3 - T_1}{T_2 + 273.14} \qquad A_2 = \frac{T_1 + 273.14}{T_2 + 273.14}$$

[EXAMPLE]

Temp. range of DP flowmeter: 0 – 400°C
Design standard of orifice: 300°C

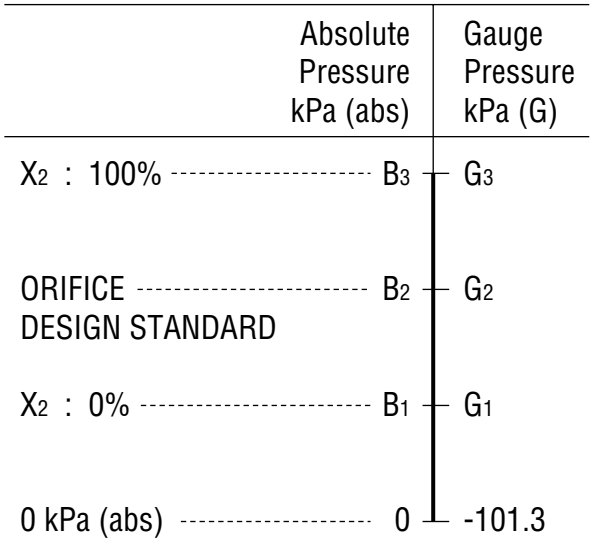
K_1 = 1

$$K_3 = \frac{400 - 0}{300 + 273.14} = 0.698$$

$$A_3 = \frac{0 + 273.14}{300 + 273.14} = 0.4766 = 47.66\%$$

PRESSURE COMPENSATION FOR DP FLOWMETER

Atmospheric pressure = 101.3 kPa (abs)



• Absolute Pressure

$$K_2 = \frac{B_3 - B_1}{B_2} \qquad A_2 = \frac{B_1}{B_2}$$

• Gauge Pressure

$$K_2 = \frac{G_3 - G_1}{G_2 + 101.3} \qquad A_2 = \frac{G_1 + 101.3}{G_2 + 101.3}$$

[EXAMPLE]

Press. range of DP flowmeter: 0 – 980 kPa (G)
Design standard of orifice: 686 kPa (G)

K_1 = 1

$$K_2 = \frac{980 - 0}{686 + 101.3} = 1.245$$

$$A_2 = \frac{0 + 101.3}{686 + 101.3} = 0.1287 = 12.87\%$$

■ FILTER/LAG FUNCTION model xJFT/JFTS (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Number (%)	OUTPER XXX.XX	Output status monitor (%) & simulation output
05	D	No input	INPPER XXX.XX	Input status monitor (%) *1
06	D	No input	INPVAL XXX.XX	Input status monitor in actual value, same unit as selected in ITEM 10.
10				TYPE OF TRANSMITTER INPUT *2
	D	11	mV-1: 5 – 100mV	
	D	12	mV-2: 0.05 – 1V	
	P	13	mV-3: 0.5 – 10V	
	P	14	mV-6: 1 – 5V	
	D	15	mV-A: 4 – 20mA	
	D	16	mV-H: 10 – 50mA	
11	P			COARSE INPUT RANGE SELECTION

		mV-1 (± mV)	mV-2 (± V)	mV-3 (± V)	mV-6/A/H
0	INPRNG: XXXX	5	0.05	0.5	No Adjustment Needed
1	INPRNG: XXXX	10	0.10	1.0	
2	INPRNG: XXXX	20	0.20	2.0	
3	INPRNG: XXXX	50	0.50	5.0	
4	INPRNG: XXXX	100	1.00	10.0	

14	P	Actual value	SCLLOW XXXXXX	Input range scaling 0% value
15	P	Actual value	SCLHIG XXXXXX	Input range scaling 100% value Use the same engineering unit as the coarse range selected in ITEM 11.
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.

REMARK 1 : Percentage of the coarse input range selected in ITEM 11.

(Example)	SCALED RANGE	COARSE RANGE	INPUT	DISPLAY
	1 – 5 V	0 – 5 V	1 V	20%
	0 – 10 V	0 – 10 V	0 V	0%
	-5 – +5 V	-5 – +5 V	0 V	0%
	-5 – +5 V	-5 – +5 V	-5 V	-100%

REMARK 2 : Data 13 and 14 are selectable without needing to make hardware change. In order to get 4 – 20 mA or 10 – 50 mA input, attach a precision resistor to input terminals.

REMARK 3 : See the following pages for function type selection.

■ MOVING AVERAGE OUTPUT model xJFT1 (Group 01)

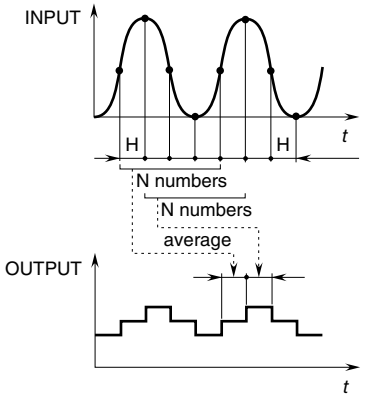
ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
23	P			FUNCTION TYPE
		0	0: NO FILTER	Without the function
		1	1: RUNNING AVE	With the moving average output
24	P	0.1 – 100.0	H XXX.X	Sampling cycle "H" (seconds)
25	P	1 – 8	N X	"N" number of samples to be calculated

[FUNCTION]

The xJFT1 samples input signals every H seconds and outputs proportionally the average of N numbers of sampled data. When a new input is sampled after another H seconds, the oldest sample is deleted and a new average is calculated including the latest sample, and a proportional output is generated.

H: Sampling cycle (0.1 to 100.0 seconds adjustable)

N: Number of samples to be calculated (1 to 8 adjustable)



■ DEAD TIME COMPUTING model xJFT2 (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
23	P			FUNCTION TYPE
		0	0: NO FILTER	Without the function
		2	2: DEAD TIME	With the dead time computing
24	P	0.1 – 100.0	H XXX.X	Sampling cycle "H" (seconds)
25	P	1 – 8	N X	"N" number of samples to be calculated
26	P	0.0 – 100.0	T XXX.X	Time constant "T" (seconds)

[FUNCTION]

The xJFT2 does not respond to an input signal for a preset dead-time duration. In addition, when a time constant T value is set, it generates a first order lag output after the dead-time.

$$Xo(s) = \frac{e^{-Ls}}{1 + Ts} \quad Xi(s)$$

Xi : Input

Xo : Output

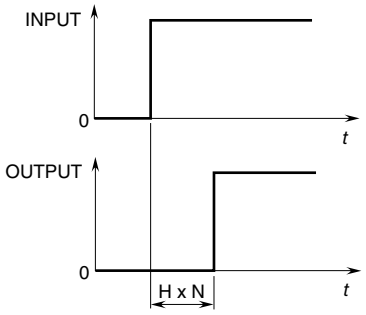
Ls : Dead-time (H × N) s

H : Sampling cycle (0.1 to 100.0 seconds adjustable)

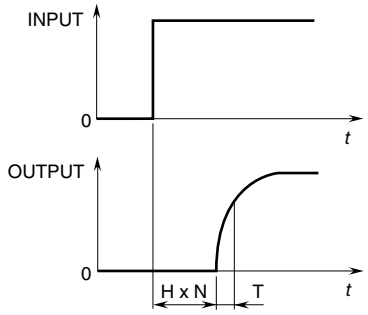
N : Number of samples to be calculated (1 to 8 adjustable)

T : Time constant (0.0 to 100.0 seconds adjustable)

• Step Input with Dead-Time



• Step Input with Dead-Time Plus Time Constant



■ DELAY BUFFER model xJFT3 (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
23	P			FUNCTION TYPE
		0	0: NO FILTER	Without the function
		3	3: LAG MODULE	With the delay buffer
26	P	0.0 – 100.0	T XXX.X	Time constant "T" (seconds)

[FUNCTION]

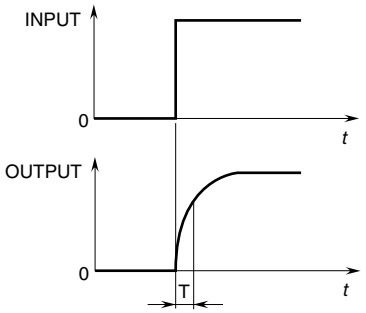
The xJFT3 generates a first order lag output.

$$Xo(s) = \frac{1}{1 + Ts} Xi(s)$$

Xi : Input

Xo : Output

T : Time constant (0.0 to 100.0 seconds adjustable)



■ LEAD TIME COMPUTING model xJFT4 (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
23	P			FUNCTION TYPE
		0	0: NO FILTER	Without the function
		4	4: LEAD MODULE	With the lead time computing
26	P	0.0 – 100.0	T XXX.X	Time constant "T" (seconds)

[FUNCTION]

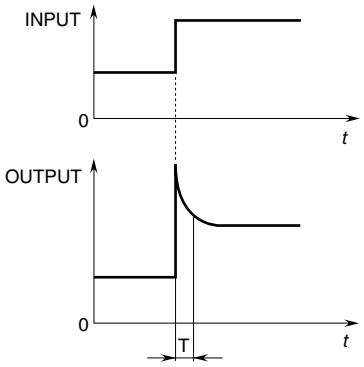
The xJFT4 operates a lead-time equation.

$$Xo(s) = (1 + Ts) Xi(s)$$

Xi : Input

Xo : Output

Ls : Lead-time constant (0.0 to 100.0 seconds adjustable)



■ RAMP BUFFER model xJFT5 (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
23	P			FUNCTION TYPE
		0	0: NO FILTER	Without the function
		5	5: RAMP BUFFER	With the ramp buffer
27	P	0.00 – 200.00	CP XXX.XX	Maximum rate of positive output change (%/s)
28	P	0.00 – 200.00	CN XXX.XX	Maximum rate of negative output change (%/s)

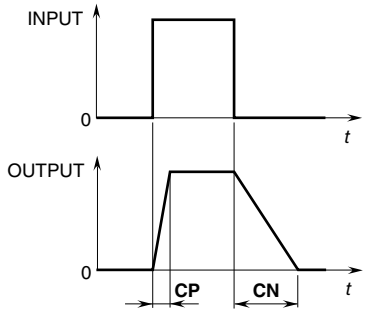
[FUNCTION]

The xJFT5 output does not change faster than the preset maximum rate, positive CP and negative CN, no matter how fast its input changes.

CP : Maximum rate of positive output change (0.00 to 200.00%/second adjustable)

CN : Maximum rate of negative output change (0.00 to 200.00%/second adjustable)

• Step Input with Rate-of-Change Limit



■ MEAN AVERAGE OUTPUT model xJFT6 (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
23	P			FUNCTION TYPE
		0	0: NO FILTER	Without the function
		6	6: MAJORITY	With the mean average output
24	P	0.1 – 100.0	H XXX.X	Sampling cycle "H" (seconds)
25	P	2 – 8	N X	"N" number of samples to be calculated
29	P	0 – 7	L X	"L" number of smallest samples to be cut off
30	P	0 – 7	U X	"U" number of largest samples to be cut off

[FUNCTION]

The xJFT6 samples input signals every H seconds and, deleting U number of largest samples and L number of smallest samples, outputs proportionally to an average of the rest [N – (U + L)] of sampled data. When the number of samples to be calculated equals 0 or less, it outputs an error.

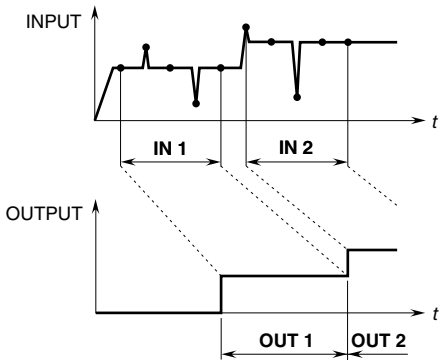
H : Sampling cycle (0.1 to 100.0 seconds adjustable)

N : Number of samples to be calculated (2 to 8 adjustable)

U : Number of largest samples to be cut off (0 to 7 adjustable)

L : Number of smallest samples to be cut off (0 to 7 adjustable)

• Example (N=5, U=1, L=1)



■ MOVING AVERAGE OUTPUT model JFTS1 (Group 01)

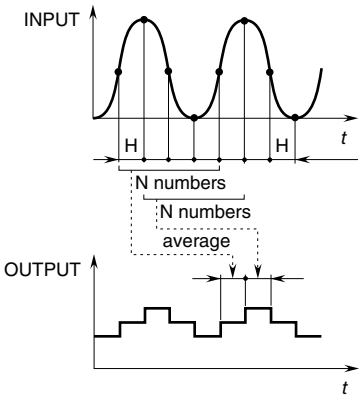
ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
23	P			FUNCTION TYPE
		0	0: NO FILTER	Without the function
		1	1: RUNNING AVE	With the moving average output
24	P	0.1 – 100.0	H XXX.X	Sampling cycle "H" (seconds)
25	P	1 – 100	N XXX	"N" number of samples to be calculated

[FUNCTION]

The JFTS1 samples input signals every H seconds and outputs proportionally the average of N numbers of sampled data. When a new input is sampled after another H seconds, the oldest sample is deleted and a new average is calculated including the latest sample, and a proportional output is generated.

H : Sampling cycle (0.1 to 100.0 seconds adjustable)

N : Number of samples to be calculated (1 to 100 adjustable)



■ DEAD TIME COMPUTING model JFTS2 (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
23	P			FUNCTION TYPE
		0	0: NO FILTER	Without the function
		2	2: DEAD TIME	With the dead time computing
24	P	0.1 – 100.0	H XXX.X	Sampling cycle "H" (seconds)
25	P	1 – 100	N XXX	"N" number of samples to be calculated
26	P	0.1 – 100.0	T XXX.X	Time constant "T" (seconds)

[FUNCTION]

The JFTS2 does not respond to an input signal for a preset dead-time duration. In addition, when a time constant T value is set, it generates a first order lag output after the dead-time.

$$Xo\,(s) = \frac{e^{-Ls}}{1 + Ts}\,Xi\,(s)$$

Xi : Input

Xo : Output

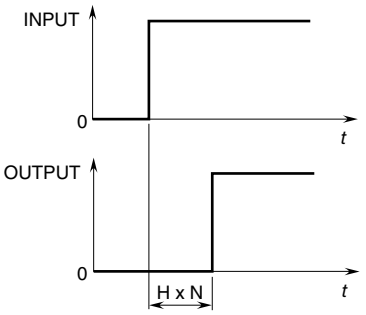
Ls : Dead-time (H × N) s

H Sampling cycle (0.1 to 100.0 sec. adj.)

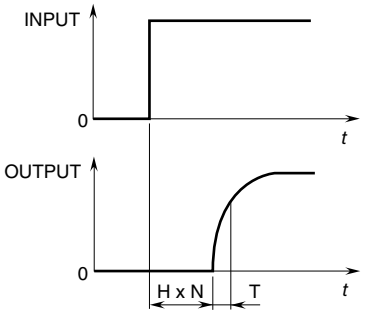
N Number of samples to be calculated (1 to 100 adjustable)

T Time constant (0.1 to 100.0 sec. adj.)
H ≤ T, T = 0 with no first-order lag

• Step Input with Dead-Time



• Step Input with Dead-Time Plus Time Constant



■ ANALOG BACKUP STATION model JB (Group 01)

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable*1
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	D	No input	OUTPER XXX.XX	Output status monitor (%)
04	D	No input	OUTVAL XX.XXX	Output status monitor (mA)
05	D	No input	INPPER XXX.XX	Input status monitor (%)
06	D	No input	INPVAL XX.XXX	Input status monitor (mA)
10	P		WRITE DEFAULT	All default settings are done at once with this command.
		ENTER	COMPLETED	
21	P			MANUAL CONTROL MODE This determines the way JB unit responds when it is switched to manual operation mode. Default = 1
		1	1: DIRECT	MODE 1: Holds the CAS control signal at the moment of the MAN command.
		2	2: TRACE BACK	MODE 2: Goes back to the preset time period (ITEM 28) and holds the CAS control signal at that moment.
		3	3: FIXED VALUE	MODE 3: Holds a specific value preset in ITEM 29.
22	P	Percentage	SLDBAK XXX.XX	TRANSITION RESPONSE Unit: %/sec., 0.00 – 200.00%/sec. adjustable. When set to 0.00, JB unit returns without any transition period back to CAS operation with MAN command input OFF. Default = 0.00
23	P			UP/DOWN RESPONSE MODE This determines the way the JB unit reponds when either UP or DOWN key is pressed during MAN. mode. Default = 0
		1	1: UNIFORM	MODE 1: Responds at a constant rate while the key is pressed.
		2	2: ONE+UNIFORM	MODE 2: Responds once when the key is pressed and starts responding at a constant rate after that if it is continuously pressed.
		3	3: ACCELERATED	MODE 3: Responds in an increasing rate when the key is pressed and starts responding at a constant rate after that.
24	P	Percentage	KEYRES XXX.XX	UP/DOWN RESPONSE TIME Default = 10.00 Unit: %/sec., 0.00 – 200.00%/sec. adjustable
25	P			HI/LO ALARM AT CASCADE CONTROL Default = 0
		0	0: NO ALARM	Without alarm setpoint
		1	1: LOW ALARM	With LOW setpoint only
		2	2: HIG ALARM	With HIGH setpoint only
		3	3: ALL ALARM	With both HIGH & LOW setpoins
26	P	Percentage	ALMLOW XXX.XX	LOW alarm setpoint *2 Unit: %, Default = -25.00
27	P	Percentage	ALMHIG XXX.XX	HIGH alarm setpoint *2 Unit: %, Default = 125.00
28	P	Number	TRACEBACK XX.X	Retroactive time period, Default = 0.0 Unit: seconds, 0.0 – 10.0 adjustable
29	P	Percentage	MANFIX XXX.XX	Default output at manual control mode Unit: %, -25.00 – +125.00 adjustable Default = 0.00
30	P	Percentage	PWRFIX XXX.XX	Default output at manual control mode after power failure and recovery, Default = -25.00 Unit: %, -25.00 – +125.00 adjustable

REMARK 1 : When the Maintenance Switch is turned to "PRG" mode, RUN output relay is open and its coil is de-energized.

REMARK 2 : The HIGH and LOW alarm relays trip or reset when the CAS input signals vary as described in the following examples:

LOW ALARM RELAY TRIPS when the decreasing CAS input signal equals or goes below the setpoint entered in ITEM 26 (GROUP 01).

[EXAMPLE] When the setpoint is 0.00%, the relay trips when the CAS input equals or goes below 4.00 mA (0.00%).

LOW ALARM RELAY RESETS when the CAS input signal increases and exceeds the setpoint value plus 1% of hysteresis (deadband).

[EXAMPLE] When the setpoint is 0.00%, the relay remains tripped with the CAS input 4.160 mA (1.00%) and resets when it reaches and exceeds 4.162 mA (1.01%).

HIGH ALARM RELAY TRIPS when the increasing CAS input signal equals or exceeds the setpoint entered in ITEM 27 (GROUP 01).

[EXAMPLE] When the setpoint is 100.00%, the relay trips when the CAS input equals or exceeds 20.00 mA (100.00%).

HIGH ALARM RELAY RESETS when the CAS input signal decreases and goes below the setpoint value minus 1% of hysteresis (deadband).

[EXAMPLE] When the setpoint is 100.00%, the relay remains tripped with the CAS input 19.840 mA (99.00%) and resets when it reaches and goes below 19.839 mA (98.99%).

■ **3-input MIDDLE SELECTOR model JFKM (Group 01)**

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
01	S			MAINTENANCE SWITCH (lock command)
		0	MTSW: MON.MODE	MONITOR mode: data monitoring only
		1	MTSW: PRG.MODE	PROGRAM mode: "P" marked data modifiable
02	P	Alphabets & No.	TG: XXXXXXXXXX	Tag name entry (10 characters max.)
03	P	Percentage	OUTPER XXX.XX	Output status monitor (%) & simulation output
04	D	No input	INPPER 1 XXX.XX	Input 1 status monitor (%)
05	D	No input	INPPER 2 XXX.XX	Input 2 status monitor (%)
06	D	No input	INPPER 3 XXX.XX	Input 3 status monitor (%)
19	P	Percentage	FINZER	Fine zero adjustment Initial status shows actual bias (%). When data is entered, output (%) is shown.
20	P	Percentage	FINSPN	Fine span adjustment Initial status shows actual gain (%). When data is entered, output (%) is shown.

SECTION B.
JX Series Field Programmable Pulse Transmitters

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GROUP 00 : SYSTEM FUNCTION TABLE 36

GROUP 01 : USER FUNCTION TABLE 37

B-1. INTRODUCTION

The fundamental procedures required for configuring input data of the JX series field programmable pulse transmitters are explained in this section. In order to do this, the Model PU-2A programming unit is required.
Each function is easily programmable via the PU-2A keyboard by selecting a specific number ([DATA] entry for each [ITEM]) from the table of the specific unit function. The operator need only understand the meaning of each [ITEM] in order to program the unit. No special programming skills or software is required.
There is specific terminology associated with the PU-2A programming unit. The table categories are called [GROUP], which define whether the data is common for many types of transmitters or inherent for each transmitter model. Each group has several [ITEM] numbers, each of which show what is to be programmed or monitored. [DATA] is the specific input value or percentage to be adjusted. The PU-2A programming unit's operations are based on these three levels: [GROUP] – [ITEM] – [DATA].

B-2. GENERAL OPERATION DESCRIPTION

■ DESCRIPTION

• When You Want to Monitor the Transmitter Status in Operation:

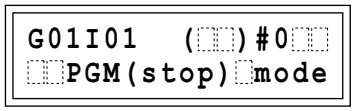
1) Connect the PU-2A to the transmitter via the front modular jack.
2) Specify an item to be monitored.
   Press [GROUP] NN [ITEM] NN. (N = number entry keys)
3) Specify another item if necessary. Repeat (2).
4) Disconnect the PU-2A.

• When You Want to Change Parameters:

1) Connect the PU-2A to the transmitter via the front modular jack.
2) Switch the transmitter into PROGRAM mode with PU-2A.
3) Specify an item to be changed.
   Press [GROUP] NN [ITEM] NN [DATA] N (NNN....) [ENTER] (N = number entry keys)
4) Specify another item if necessary. Repeat (3).
5) **Switch the transmitter into MONITOR mode with PU-2A.**
   The changed parameters are saved in the nonvolatile memory.
6) Disconnect the PU-2A.

■ MAINTENANCE SWITCH & OPERATION MODES

There are two operation modes for JX pulse transmitters: MONITOR mode and PROGRAM mode. You use the Maintenance Switch, lock command to prevent unauthorized access to specific data, for changing the operation mode.
In MONITOR mode, the transmitter is in normal operation, measuring, computing and outputting signals. You can only monitor parameter settings, measuring result, output status but cannot affect the transmitter's operation. No parameter change except for the Maintenance Switch is available.
In PROGRAM mode, the transmitter stops measuring and renewing the output signal. The output signal is held, but you can output a specific value for simulation and testing purposes. You can also control manually the transmitter to measure input frequency signals. Parameter settings can be changed.
For changing to the PROGRAM mode, key in [ITEM] 01 [DATA] 1 [ENTER]. The display will appear as follows:

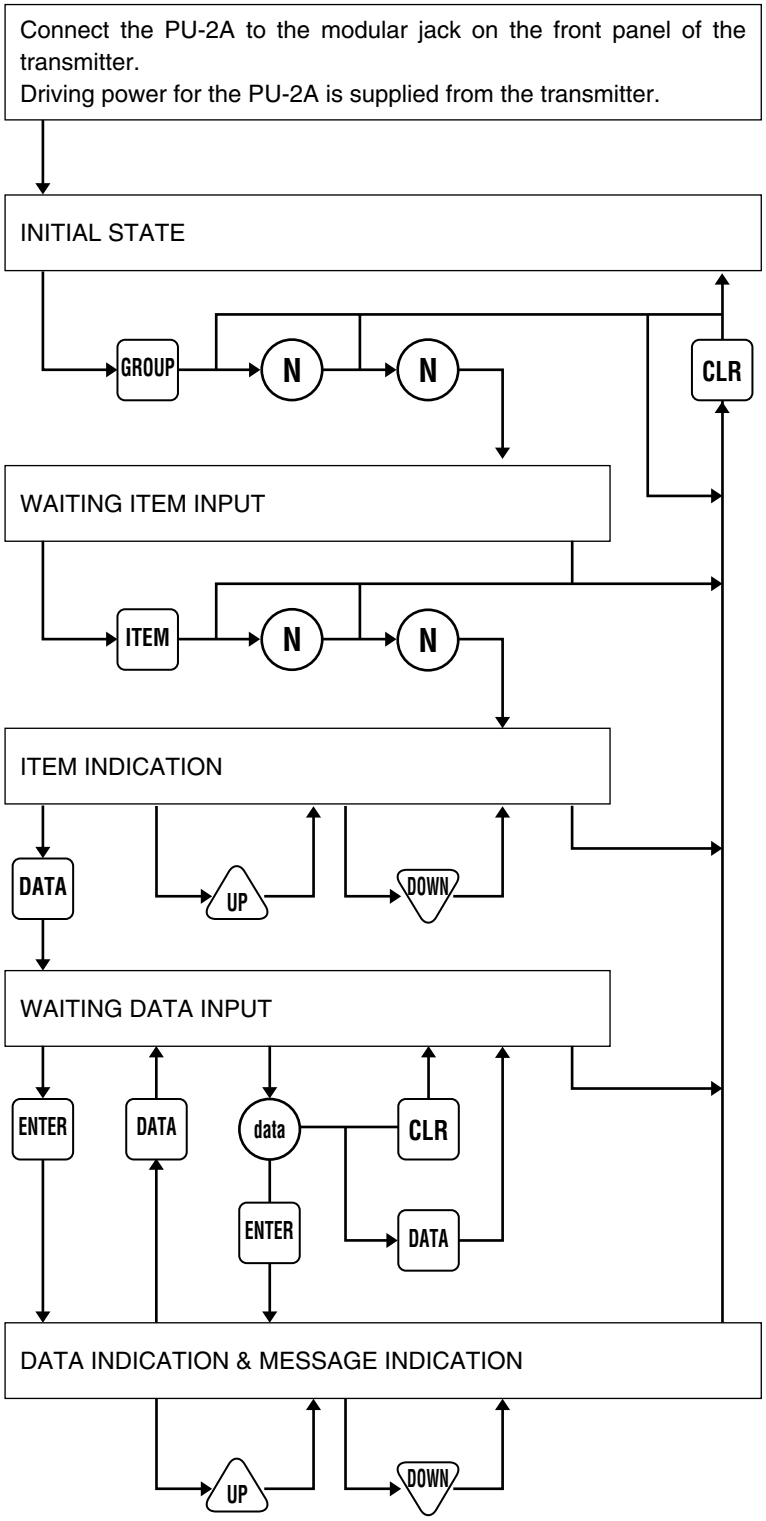


Then after a delay for a few seconds, the transmitter is switched to the PROGRAM mode.
When all the program changes are completed, be sure to return the transmitter to the MONITOR mode. The modification will be lost if you turn off power supply to the transmitter without doing it. When the power is turned on, the transmitter starts up in MONITOR mode.

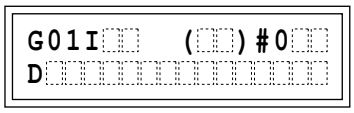
■ OUTPUT SIMULATION PROGRAMMING

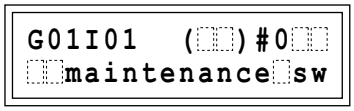
The output signal of the transmitter is held while in the PROGRAM mode, but you can output a specific value for simulation and testing purposes. Press [GROUP] 01 [ITEM] 03 [DATA] (desired output value) [ENTER]. The output value changes in accordance with further adjustments with other [ITEM]s.

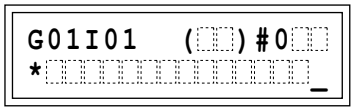
B-3. OPERATION FLOW CHART

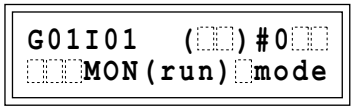


POWER SUPPLY TO THE TRANS-MITTER CAN BE TURNED ON/OFF WITH THE PU-2A CONNECTED. SAVED MEMORY WILL NOT BE LOST.









B-4. DIAGNOSTICS

In addition to basic response messages indicated in bracket on the upper line of display, the JX pulse transmitters provide more concrete diagnostics in case of an error.
When the transmitter is not able to provide a response, the PU-2A indicates "ER" in the bracket as "transmission error". Message examples, their meaning and what to do are explained in the following:

access rejected	Reading/writing request denied because it was done for an unaccessible ITEM NO. This message appears for example when you try to change parameters in MONITOR mode. **WHAT TO DO:** Switch to PROGRAM mode. If the same message appears in the PROGRAM mode, this ITEM is not accessible.
out of range !!	Parameter setting value is inappropriate, out of available range. **WHAT TO DO:** Set the parameter to an appropriate value.
invalid data	Data set in the PROGRAM mode is invalid. **WHAT TO DO:** Set correct data.
zero >= span	Lower range value is higher than the upper range value. Lower range value must be lower than the upper range value.
zero not entered	Zero parameter is undefined. This message appears when you try to monitor ITEM NO. which is unnecessary for the hardware. If it appears even for the ITEM NO. of which the parameter are used, parameters are destroyed. **WHAT TO DO:** Re-program all of them.
undefined No.	Undefined ITEM No.
still processing	This message appears when you switch from MONITOR mode to PROGRAM mode and return to the PROGRAM immediately. There is a preset delay factor for transition from MONITOR to PROGRAM for completing the last measuring and computation in the MONITOR mode.
parameter error	One or more parameters necessary for minimal operation are missing. **WHAT TO DO:** Check all the parameters.

There are possibilities of hardware failure when the following messages are displayed. Contact local sales representative or us.

calculation jam	One measuring is over before the last one.
EEPROM sum err	Check sum error of EEPROM. Data area for parameters are destroyed and unrecovered.
EEPROM read err (EEPROM time out)	Cannot read EEPROM.
EEPROM write err	Cannot write in EEPROM.
PCB mismatching	PCB ID No. does not match specifications.
device type err	Wrong transmitter type No. is registered.
PIT error !!	Counter setting of internal IC destroyed.

B-5. FUNCTION TABLE

GROUP 00 : System Function Table
GROUP 01 : User Function Table, used for changing parameters at the user site.

In the tables, each MDFY. (modification) mark indicates:
D: No modification (writing) possible. Used only for monitoring (reading).
S: Modifiable at any time.
P: Modifiable only when the MAINTENANCE SWITCH is in the "PRG" mode.

Model No.s indicated under ITEM No. are those to which the ITEM is applicable. The ITEMs without these indications are applicable to all models. For Model WJPAD, see description on JPAD.

■ GROUP 00 : SYSTEM FUNCTION TABLE

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
00	D	No input	PULSE PROCESSOR	Indicating Pulse I/O Function Transmitter
01	D	DATA, ENTR	error monitor	Error status Indicating current error
02	D		status monitor	Alarm status (ALM), cutout status (DO) and counter overflow status (OVF)
		DATA, ENTR	ALM:*, DO:*, OVF:*	* = 0: Canceled * = 1: Engaged
98	D		ROM date	ROM's last modified date
		DATA, ENTR	Nov. 18, '93	Modified (e.g.) in November 18, 1993
99	D		ROM version	ROM's version No.
		DATA, ENTR	M32PP ver 1.00a	M32PP Version (e.g.) 1.00a

■ GROUP 01 : USER FUNCTION TABLE

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
00	D	No input	– JPAD –	Indicating Model No.
01	S		maintenance sw	Maintenance Switch (lock command)
		DATA, ENTR		Current operation mode
		DATA, 0, ENTR	MON (run) mode	MONITOR mode: data monitoring only
		DATA, 1, ENTR	PGM (stop) mode	PROGRAM mode: "P" marked data modifiable
WARNING!!		**THE PROGRAM IS WRITTEN IN THE EEPROM WHEN THE TRANSMITTER IS RETURNED TO THE MONITOR MODE. THE MODIFICATION WILL NOT BE TRANSFERRED IF YOU TURN POWER SUPPLY TO THE TRANSMITTER OFF WITHOUT DOING THAT.**		
02	P		user's TAG entry	User's Tag Name entry and monitor
		DATA, ENTR		Registered Tag Name
		DATA, –, ENTR Alphabets & No.	TAG not entered! XXXXXXXXXX	Tag Name deleted Entering Tag Name (10 characters max.)
03	P		output monitor	Output, in % of zero/span frequency
JPAD JPQD JRPD JRQD		DATA, ENTR	XXX.XX %	
		DATA, data, ENTR		Entering simulation output in % (-15.00 – +115.00%) data: -15.00 – 115.00
		DATA, UP DATA, DOWN		Display data increases. Display data decreases.
05	D		measured input %	Input frequency, in % of zero/span freq.
JPAD JRPD JPRD JFRD JPSM (out1)		DATA, ENTR	XXX.XX %	
06	D		measured freq	Input frequency, in Hz
JPAD JRPD JPRD JFRD JPSM (out1)		DATA, ENTR	XXX.XXX Hz	
07	D		input counts	Input counter value
JPQD JRQD JPRD JPSM		DATA, ENTR		Current counter value
08	P		output zero freq	Lower range output frequency (= output 0%)
JARP JAPD JPRD JPSM JFRD Enter data 0 for JPSM, JPRD.		DATA, ENTR		Current set value
		DATA, data, ENTR	XXX.X xHz	Entering frequency data: 0 – 9999 (4 digits max.) with decimal point xHz: Frequency unit specified in ITEM 11
09	P		output span freq	Upper range output frequency (= output 100%)
JARP JAPD JPRD JPSM JFRD Enter numerator of the pulse rate for JPSM, JPRD.		DATA, ENTR		Current set value
		DATA, data, ENTR	XXX.X xHz	Entering frequency data: 0 – 9999 (4 digits max.) with decimal point xHz: Frequency unit specified in ITEM 11
11	P		unit frequency	Frequency unit used in programming
JPAD JRPD JARP JAPD JPRD JPSM JFRD		DATA, ENTR		Registered frequency unit
		DATA, 0, ENTR DATA, 1, ENTR DATA, 2, ENTR	Hz kHz (1000 Hz) mHz (0.001 Hz)	Hz kHz mHz
		DATA, UP DATA, DOWN		Display data No. increases. Display data No. decreases.

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
12	P		input zero freq.	Lower range input frequency (= output 0%)
JPAD JRPD (JARP JAPD) JPRD JPSM JFRD Enter data 0 for JPSM, JPRD.		DATA, ENTR		Current set value
		DATA, data, ENTR	XXX.X xHz	Entering frequency data: 0 – ±9999 (4 digits max.) with decimal point xHz: Frequency unit specified in ITEM 11
13	P		input span freq.	Upper range input frequency (= output 100%)
JPAD JRPD (JARP JAPD) JPRD JPSM JFRD Enter denominator of the pulse rate for JPSM, JPRD.		DATA, ENTR		Current set value
		DATA, data, ENTR	XXX.X xHz	Entering frequency data: 0 – 9999 (4 digits max.) with decimal point xHz: Frequency unit specified in ITEM 11
14	P		zero count	Lower range count (= output 0%)
JPQD JRQD		DATA, ENTR		Current set value
		DATA, data, ENTR	xXXXXXXX counts	Entering count value data: 0 – ±1048575 x: Negative sign (–); positive (+) is not indicated.
15	P		span count	Upper range count (= output 100%)
JPQD JRQD		DATA, ENTR		Current set value
		DATA, data, ENTR	XXXXXXX counts	Entering count value data : 0 – 1048575
18	P		zero bias adj VR	Output fine adjustment (zero)
JPAD JPQD JRPD JRQD		DATA, ENTR		Current set value in %
		DATA, data, ENTR	XXX.XX %	Entering desired bias, ±15.00% (85.00 – 115.00% of zero frequency (=100.00%) data : 85.00 – 115.00
		DATA, UP DATA, DOWN		Display data increases. Display data decreases.
19	P		gain adj VR	Output fine adjustment (span)
JPAD JPQD JRPD JRQD		DATA, ENTR		Indicating current set value in %
		DATA, data, ENTR	XXX.XX %	Entering desired gain, ±15.00% (85.00 – 115.00% of span frequency (=100.00%) data : 85.00 – 115.00
		DATA, UP DATA, DOWN		Display data increases. Display data decreases.
20	P		drop out timer	Specifying cutout time
JPAD JRPD JPRD JPSM JFRD		DATA, ENTR		Indicating current set value
		DATA, data, ENTR	XXXXX msec.	Entering desired cutout time (100 msec. – 300 sec.) data : 100 – 300000 (msec.), 5 msec. increments
		DATA, UP DATA, DOWN		Display data increases. Display data decreases.
21	P		sampling timer	Specifying sampling time
JPAD JRPD JPRD JPSM JFRD JRQD		DATA, ENTR		Indicating current set value
		DATA, data, ENTR	XXXXX msec.	Entering desired sampling time (50 msec. – 100 sec.) data : 50 – 100000 (msec.), 5 msec. increments
		DATA, UP DATA, DOWN		Display data increases. Display data decreases.
22	P		updating timer	Specifying output update time
JPAD JPQD JRPD JRQD		DATA, ENTR		Indicating current set value
		DATA, data, ENTR	XXXXX msec.	Entering desired output update time (50 msec. – 100 sec.) data : 50 – 100000 (msec.), 5 msec. increments
		DATA, UP DATA, DOWN		Display data increases. Display data decreases.

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
23	P		running ave qty	Specifying number of samples used for calculating transfer (running) average
JPAD JRPD JPRD JPSM JFRD		DATA, ENTR		Indicating current setting
		DATA, 1, ENTR	running ave off	Transfer average function cancelled
		DATA, data, ENTR	X data	Entering number of samples, data : 2 – 8
		DATA, UP DATA, DOWN		Display data increases. Display data decreases.
24	P		alarm threshold	Specifying alarm setpoint
JPAD JPQD JRPD JRQD JARP JAPD		DATA, ENTR		Indicating current set value (%)
		DATA, data, ENTR	XXX.XX%	Entering setpoint (0 – 100.00%) data : 0 – 100.00
		DATA, UP DATA, DOWN		Display data increases. Display data decreases.
25	P		alarm hysteresis	Specifying hysteresis (deadband) for alarm setpoint
JPAD JPQD JRPD JRQD JARP JAPD		DATA, ENTR		Indicating current set value (%)
		DATA, data, ENTR	XXX.XX %	Entering setpoint (0 – 20.00%) data : 0 – 20.00
		DATA, UP DATA, DOWN		Display data increases. Display data decreases.
26	P		alarm mode	Specifying alarm operation mode
JPAD JPQD JRPD JRQD JARP JAPD		DATA, ENTR		Indicating current mode
		DATA, 0, ENTR DATA, 1, ENTR		Low alarm trip High alarm trip
27	P		overflow mode	Specifying output mode at counter overflow
JPQD		DATA, ENTR		Indicating current mode
		DATA, 0, ENTR DATA, 1, ENTR	overflow : reset overflow : halt	Counter is reset to 0% and restart counting. Counter is stopped at the span count value. For returning to 0%, external reset input is needed.
28	P		initial count sw	Specifying output mode at power ON
JPQD JRQD		DATA, ENTR		Indicating current mode
		DATA, 0, ENTR DATA, 1, ENTR DATA, –, ENTR	count : cold start count : hot start count (mem) reset	Counter starts from 0%. Counter starts from the value stored at power OFF. Counter value stored in non-volatile memory is deleted.
29	P		encdr prescaler	Prescaling the rotary encoder signal
JRPD JRQD		DATA, ENTR		Indicating current scale
		DATA, 0, ENTR DATA, 1, ENTR DATA, 2, ENTR DATA, 3, ENTR DATA, 4, ENTR	prescaler : 1/4 prescaler : 1/2 prescaler : 1/1 prescaler : 2/1 prescaler : 4/1	Scaling input pulse by 1/4 before measuring Scaling input pulse by 1/2 before measuring Measuring without scaling Scaling input pulse by 2/1 before measuring Scaling input pulse by 4/1 before measuring
		DATA, UP DATA, DOWN		Display data No. increases. Display data No. decreases.
30	P	DATA, ENTR	measuring freq	Manual frequency measuring Indicating current status
(JPAD JRPD) JARP JAPD			meas completed meas in progress	Measuring completed or not started yet Measuring not completed yet
		DATA, 0, ENTR	meas quitted	Manual frequency measuring stop command Indicating that manual measuring is stopped.
		DATA, 1, ENTR	meas started	Manual frequency measuring start command Indicating that manual measuring is started.
		This ITEM can be used in PROGRAM mode only (not in a measuring cycle).		
31	P		fiz capturing	Capturing lower range input frequency
(JPAD JRPD) JARP JAPD		DATA, ENTER		Current set value
		DATA, 1, ENTR	fiz captured	Frequency captured

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
32	P		fis capturing	Capturing upper range input frequency
(JPAD JRPD) JARP JAPD		DATA, ENTR		Current set value
		DATA, 1, ENTR	fis captured	Frequency captured

ITEM	MDFY.	DATA INPUT	DISPLAY	CONTENTS
33	P		output frq limit	Output frequency limit
JPRD JPSM		DATA, ENTR		Current set value
		DATA, data, ENTR		Entering frequency (minimum 0.1 Hz)
34	P		prms initializer	Setting all parameters to default values.
		DATA, 1, ENTR	all prms default	Setting complete
		Warning! ROM Version: M32PP V2.06, ROM Date: Aug05'96 For the PU-2A with a ROM version earlier than the above, be sure to use this item in PROGRAM mode, because the program may end in error if operated in MONITOR mode. Press DATA - ENTER.		