

## Space-saving Plug-in Signal Conditioners H-UNIT

## FILTER/LAG TRANSMITTER

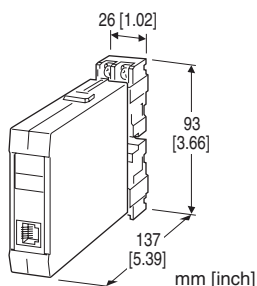
(field-programmable)

## Functions &amp; Features

- Providing various filter functions which eliminate unnecessary elements in the input signals
- Microprocessor based
- On-site calibration via hand-held programmer PU-2x
- Field-programmable input range
- High-density mounting

## Typical Applications

- Level control; eliminating drifts in the input signal caused by pumps



## MODEL: HJFT[1]-[2][3]-R[4]

## ORDERING INFORMATION

- Code number: HJFT-[1]-[2][3]-R[4]  
Specify a code from below for each of [1] through [4].  
(e.g. HJFT1-6A-R/Q)
  - Special input range (For codes U1, U2 & U3)
  - Parameters (See "Functions" section)
- Default setting will be used if not otherwise specified.  
Use Ordering Information Sheet (No. ESU-1679) to specify parameters.
- Specify the specification for option code /Q  
(e.g. /C01/S01)

| ITEM                                      | DEFAULT                              |
|---|--------------------------------------|
| Sampling cycle: H                         | 0.1                                  |
| No. of samples to be calculated: N        | 1 (2 for mean average output filter) |
| Time constant: T                          | 0.0                                  |
| Max. rate of positive output change (CP)  | 200.00                               |
| Max. rate of negative output change (CN)  | 200.00                               |
| No. of smallest samples to be cut off (L) | 0                                    |
| No. of largest samples to be cut off (U)  | 0                                    |

## [1] FUNCTION

- 1: Moving average output
- 2: Dead-time computing
- 3: Delay buffer
- 4: Lead-time computing
- 5: Ramp buffer
- 6: Mean average output

## [2] INPUT

## Current

A: 4 – 20 mA DC (Input resistance 250  $\Omega$ )H: 10 – 50 mA DC (Input resistance 100  $\Omega$ )

## Voltage

6: 1 – 5 V DC (Input resistance 1 M $\Omega$  min.)U1: Range  $\pm 100$  mV;(Minimum span 3 mV, Input resistance 20 k $\Omega$  min.)U2: Range  $\pm 1000$  mV;(Minimum span 30 mV, Input resistance 20 k $\Omega$  min.)U3: Range  $\pm 10$  V;(Minimum span 0.3 V, Input resistance 1 M $\Omega$  min.)

## [3] OUTPUT

## Current

A: 4 – 20 mA DC (Load resistance 600  $\Omega$  max.)

## Voltage

6: 1 – 5 V DC (Load resistance 500  $\Omega$  min.)

## POWER INPUT

## DC Power

R: 24 V DC

(Operational voltage range 24 V  $\pm 10$  %, ripple 10 %p-p max.)

## [4] OPTIONS

blank: none

/Q: With options (specify the specification)

## SPECIFICATIONS OF OPTION: Q (multiple selections)

## COATING (For the detail, refer to our web site.)

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

## TERMINAL SCREW MATERIAL

/S01: Stainless steel

## RELATED PRODUCTS

- Programming Unit (model: PU-2x)
- PC configurator software (model: JXCON)

Downloadable at our web site.

A dedicated cable is required to connect the module to the

PC. Please refer to the internet software download site or the users manual for the PC configurator for applicable cable types.

## GENERAL SPECIFICATIONS

**Construction:** Plug-in

**Connection:** M3.5 screw terminals (torque 0.8 N·m)

**Screw terminal:** Nickel-plated steel (standard) or stainless steel

**Housing material:** Flame-resistant resin (black)

**Isolation:** Input to output to power

**Overrange output:** Approx. -10 to +120 % at 1 - 5 V

**Adjustments:** Programming Unit (model: PU-2x); function and parameters, input range, zero and span, etc.

(Input range can be changed with Codes U1, U2 or U3 and limited within ranges of each code type.)

(Refer to the users manual of JXCON for the adjustments configurable with JXCON.)

## INPUT SPECIFICATIONS

### ■ DC Current:

Shunt resistor attached to the input terminals (0.5 W)

### ■ DC Voltage: -10 - +10 V DC

**Minimum span:** 3 mV

**Offset:** Max. 3 times span

Default setting will be used if not otherwise specified.

**U1:** 0 - 100 mV DC

**U2:** 0 - 1 V DC

**U3:** 0 - 10 V DC

## INSTALLATION

**Current consumption:** Approx. 90 mA

**Operating temperature:** -5 to +55°C (23 to 131°F)

**Operating humidity:** 30 to 90 %RH (non-condensing)

**Mounting:** Surface or DIN rail; Standard Rack Mounting

Frame BX-16H available

**Weight:** 220 g (0.49 lb)

## PERFORMANCE in percentage of span

**Accuracy:**  $\pm 0.1$  %

**Temp. coefficient:**  $\pm 0.015$  %/°C ( $\pm 0.008$  %/°F)

**Response time:**  $\leq 0.5$  sec. (0 - 90 %) without any function setting

**Line voltage effect:**  $\pm 0.1$  % over voltage range

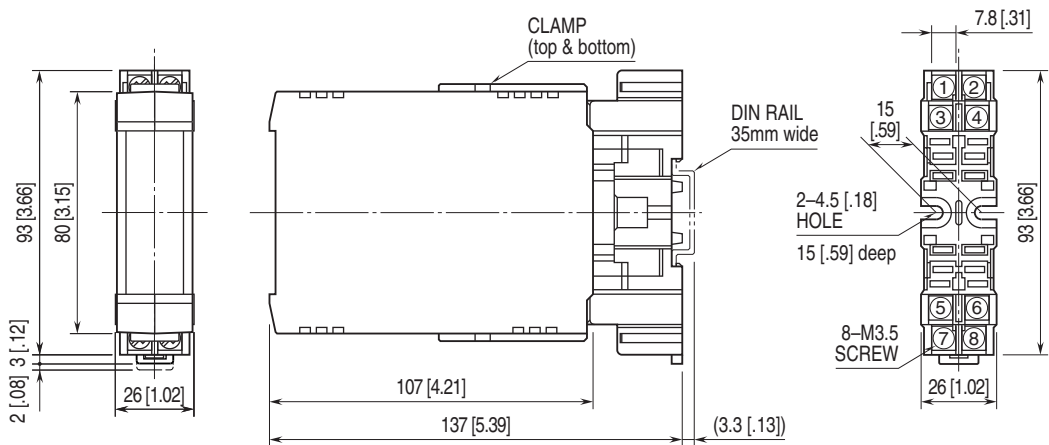
**Insulation resistance:**  $\geq 100$  M $\Omega$  with 500 V DC

**Dielectric strength:** 500 V AC @ 1 minute

(input to output to power)

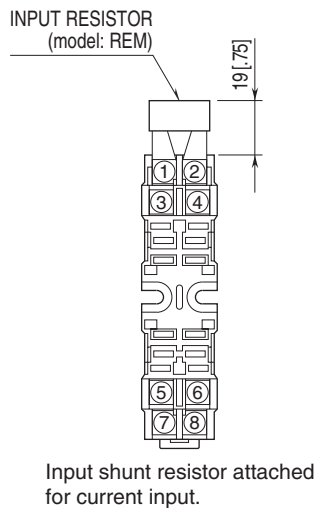
1500 V AC @ 1 minute (input or output or power to ground)

EXTERNAL DIMENSIONS unit: mm [inch]

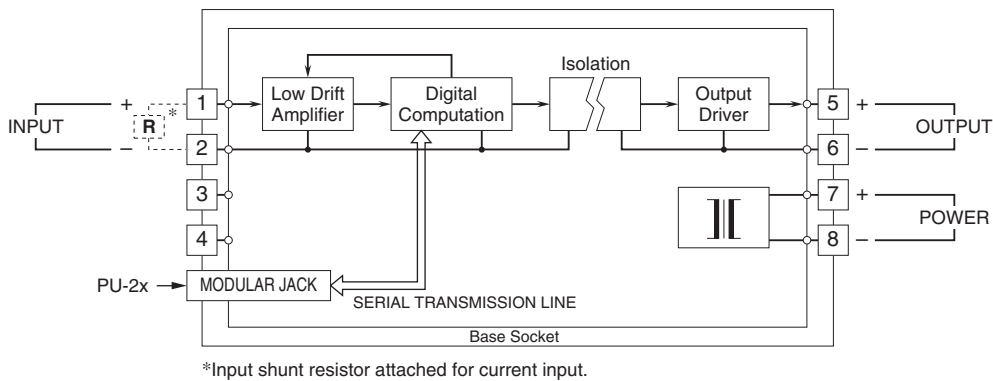


•When mounting, no extra space is needed between units.

TERMINAL ASSIGNMENTS unit: mm [inch]



SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

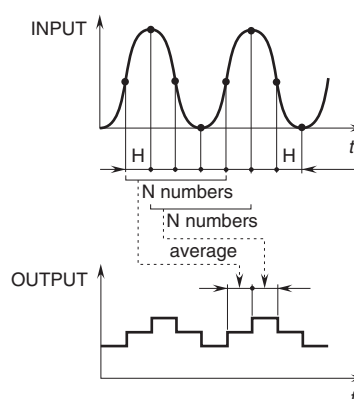


## FUNCTIONS

### ■ MOVING AVERAGE OUTPUT

This unit samples input signals every H seconds and outputs proportionally to an average of N numbers of sampled data. When a new input is sampled after another H seconds, it gives up the oldest sample and calculates a new average including the latest sample and outputs proportionally.

- H : sampling cycle  
(0.1 to 100.0 seconds adjustable)
- N : number of samples to be calculated  
(1 to 8 adjustable)



### ■ DEAD-TIME COMPUTING

This unit does not respond to an input signal for a preset dead-time duration. In addition, with adjusting a time constant T, it generates a first order lag output after the dead-time.

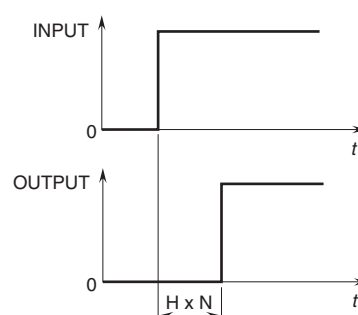
$$X_0(s) = \frac{e^{-Ls}}{1 + Ts} X_1(s) + H \times N(s)$$

- $X_0$  : output
- $X_1$  : input

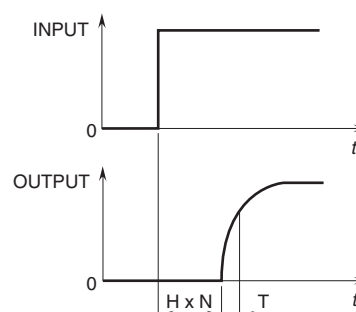
$$\text{Dead Time} = H \times N \quad (H \leq T)$$

- H : sampling cycle  
(0.1 to 100.0 seconds adjustable)
- N : numbers 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



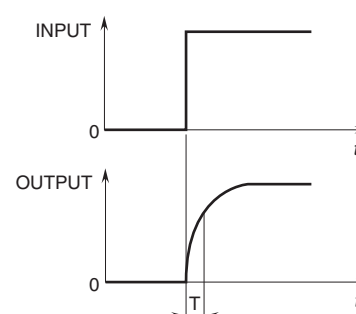
### ■ DELAY BUFFER

This unit generates a first order lag output.

$$X_0(s) = \frac{1}{1 + Ts} X_1(s)$$

- $X_0$  : output
- $X_1$  : input
- T : time constant  
(0.0 to 100.0 second adjustable)

#### •Step Input with Time Constant



## ■ LEAD-TIME COMPUTING

This unit operates a lead-time equation.

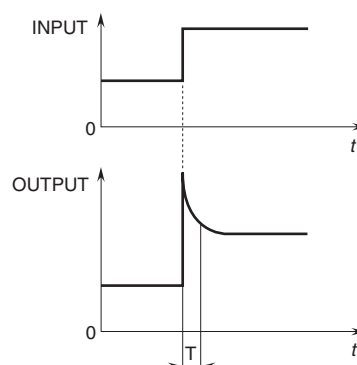
$$X_0(s) = (1 + T s) X_1(s)$$

$X_0$  : output

$X_1$  : input

$T$  : lead-time constant  
(0.0 to 100.0 seconds adjustable)

## •Step Input with Time Constant (Lead)



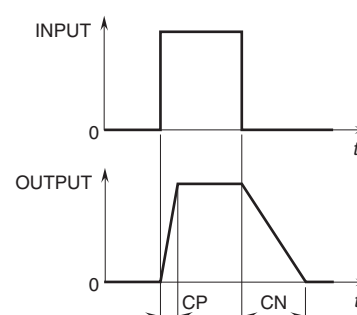
## ■ RAMP BUFFER

This unit output does not change faster than a 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

This unit samples input signals every H seconds and, excluding U numbers of largest samples and L numbers 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.

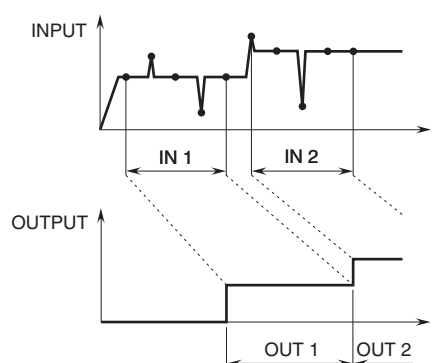
H : sampling cycle  
(0.1 to 100.0 seconds adjustable)

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)



Specifications are subject to change without notice.