

FEATURES

- ✧ Universal Inputs - T/C, RTD, mA, V.
- ✧ Dual Input and Dual Indication.
- ✧ Potential Free contact outputs.
- ✧ Fully Front panel Programmable.
- ✧ Isolated Retransmission output.
- ✧ Tamper Proof Software Calibration.
- ✧ Wide supply Tolerance- 90 to 270V.
- ✧ Set of Powerful Software Modules.



About *Smart Ind*

Smart Ind a constituent of the **Cerebrum** series of Smart instruments from MCIH, offers economically viable solutions for your simple to complex monitoring problems. It is a microcontroller based instrument with wide programmability which makes it absolutely flexible.

***Smart Ind* is Universal.....** Smart Ind is designed with the sole concept that it should be universal in every aspect - right from choice of inputs, outputs to programmable functions. Smart Ind even fits to any mains standard 110V / 220V AC. Smart Ind remains as a single model meant to perform many functions. Worth mentioning a few are Temperature indicator, ON - OFF Controller, Flow Indicator, Hi-Lo Selector / Indicator, Computational Module, Deviation Alarm indicator etc.,. Even the retransmission output of Smart Ind can be selected either as voltage or current output by software.

***Smart Ind* is Unique.....** Smart Ind is truly smart. While many programmable instruments do require hardware access for type selection and calibration, Smart Ind totally eliminates any hardware access or switch settings by its unique design - all it requires is just a few key strokes at the front panel keyboard. This unique feature enhances the operational reliability of the instrument.

***Smart Ind* is Polymorphous.....** Smart Ind is fully programmable from the front panel. Its functional and mathematical modules can be suitably soft wired to fulfill any demanding application. This adaptability of Smart Ind reduces the inventory to single model against keeping multiple models of conventional instruments. Smart Ind also offers five ready to use preprogrammed templates meant to ease programming. On selection of these templates, Smart Ind gets ready with the relevant program meant for the application.

PERFORMANCE SPECIFICATIONS

POWER SUPPLY

90 to 270V AC / 50-60 Hz; Can work with any of the following power lines.

DISPLAY

Type : Dual - 4 digit / 12.5mm LED display

Range : -1999 to 9999.

Resolution : one LSD.

INPUT

Type	Range	Limits	Accuracy °C
T/C - J	-200 to 700 °C	±10V	±2
T/C - K	-200 to 1200 °C	±10V	±3
T/C - E	0 to 800 °C	±10V	±3
T/C - T	-200 to 400 °C	±10V	±3
T/C - R	0 to 1700 °C	±10V	±6
T/C - S	0 to 1700 °C	±10V	±6
Pt100 ²	-200 to 850 °C	±10V/open	±1.5

Note 1: All T/Cs - NIST Monograph 125. Ranges refer to the

Basic Ranges³

Type	Range	Limits	Accuracy % FS
mV1	0 to ±21 mV	±10V	±0.25
mV2	0 to ±105 mV	±10V	±0.1
V1	0 to ±2 V	±40V	±0.25
V2	0 to ±10 V	±40V	±0.1
R1	0 to 80 Ω	±10V/open	±0.25
R2	0 to 400 Ω	±10V/open	±0.1
mA1	0 to ±4 mA	±40mA	±0.25
mA2	0 to ±20 mA	±40mA	±0.1

Note 3: User can define any range confined with in the limits of the Basic range. However Accuracies refer to

INPUT (Continued...)

Filter : User configurable Digital filter.

Impedance : 5MΩ min for mV and T/C input.
470 kΩ min for Voltage inputs.
6 Ω max for mA inputs.

CJC : Cold Junction Compensation
By solid state sensor.

Sensor break : Indication upscale.

Tx - Powering : Two two-wire Transmitters can be powered. Short circuit protected to prevent loop burn out.

Calibration : By Software through keypad.
No screw driver adjustments or hardware access required.

OUTPUT

Retransmission

Type : 0 - 20mA / 4 - 20mA / 1 - 5V / 0 - 5 V
0 - 10V software Configurable.

Accuracy : ± 0.1% of 20mA / 10V - refers to output module only.

Load : mA output - 600 Ω maximum.
Voltage output - 10 KΩ minimum.

Isolation : Optical isolation - 600V DC or AC peak.

ALARMS

Type : Hi / Lo / Deviation.

Setting : Can be set directly in engineering units or in % by software.

Hysteresis : Software settable.

Indication : By front panel LEDs.

Output : Three potential free change over contacts rated for 220V AC / DC

GENERAL SPECIFICATIONS

DIMENSIONS

Bezel : 96 mm x 96 mm

Cutout : 92 +0.8 mm x 92 +0.8mm

Depth : 175 mm

Mounting : Flush panel

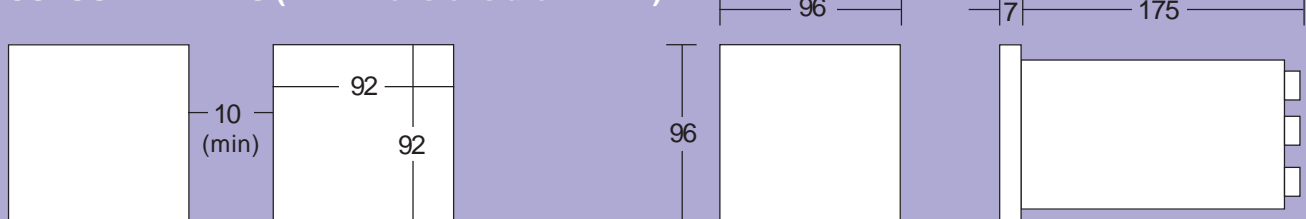
ENVIRONMENT

Operating Temperature : 0 to 55 °C

Storage Temperature : 0 to 70 °C

Humidity : 0 - 90 %

CUTOUT DETAILS (All Dimensions are in mm)



Specifications are subject to change with out any notice due to continuous development.

ORDERING INFO

Model : Smart Ind

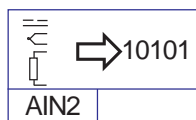
No other ordering information is required as all the parameters are user configurable.

SOFTWARE MODULES

Programming Smart Ind involves interconnection of software modules suitably to achieve desired functions, display and output. A flow chart can be obtained using the modules to fulfill any given requirement and can be implemented in to Smart Ind through the front panel key board. The software modules are broadly classified according to their position in a flow chart as illustrated below.

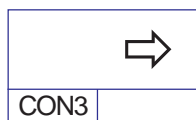
LEFT END MODULES:

Hard wired input and soft-wired output.



Analogue Input Modules - 2

Condition Analog inputs like mv, mA, Volts, ohms, T/C & RTD in to 0-100% software output.

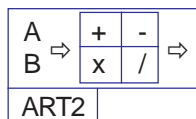


Constant Modules - 3

Constant modules hold user programmed constants and output them to other linked modules.

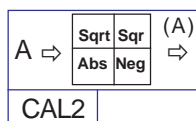
MIDDLE MODULES:

Soft-wired input and soft-wired output.



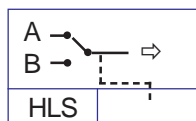
Arithmetic Modules - 2

Addition : $C1 \times A + C2 \times B + C3$
 Subtraction : $C1 \times A - C2 \times B - C3$
 Averaging : $(C1 \times A + C2 \times B) / 2$
 Multiplication : $(C1 + A) \times (C2 + B) / C3$
 Division : $(C1 + A) / (C2 + B) \times C3$



Calculation Modules - 2

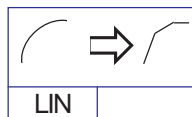
Square root : $C1 \times \sqrt{A} + C2$
 Square : $C1 \times A^2 + C2$
 Absolute : $C1 \times |A| + C2$
 Negate : $C1 \times (-A) + C2$



Hi-Lo Selector - 1

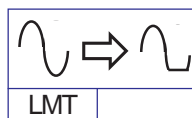
Selects & outputs Hi or Lo of the two inputs as programmed by the user.

MIDDLE MODULES (Continued ...)



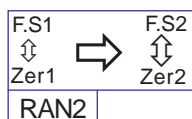
Linearizer - 1

Linearizes the output from a non linear transducer using 11 point piece wise linearisation technique.



Limiting Module - 1

Limits the output to the Lo & Hi limits set by the user when the input exceeds the same.

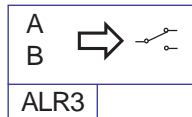


Ranging Modules - 2

The input is scaled up or down to any user defined range with in -999 and +9999.

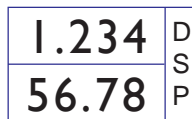
RIGHT END MODULES:

Soft-wired input and Hard wired output.



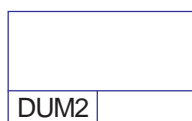
Alarm Modules - 3

Gives a potential free change over type contact output. User can set the alarm type to Hi, Lo or Deviation.



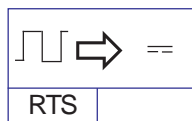
Dual Display Module - 1

Sends the output to Dual 4 digit LED display which can indicate -1999 to 9999. Resolution can be set by the user.



Dummy Modules - 2

Used to complete the programming path when there is a hanging middle or left end module.



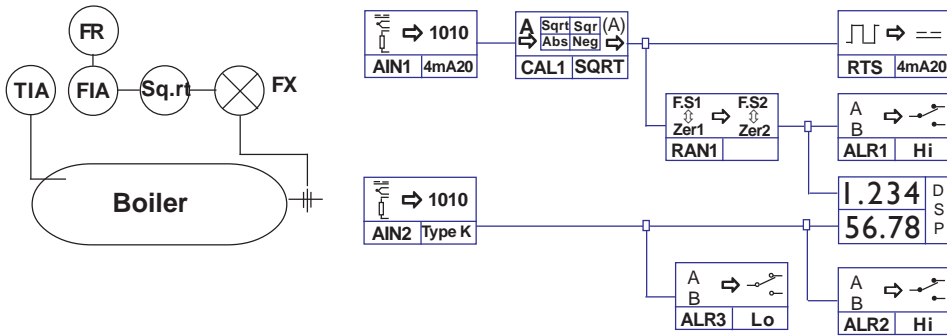
Retransmission Module - 1

Outputs isolated 4-20mA / 0-20mA / 0-5V / 1-5V / 0-10V depending on the user selection.

APPLICATIONS

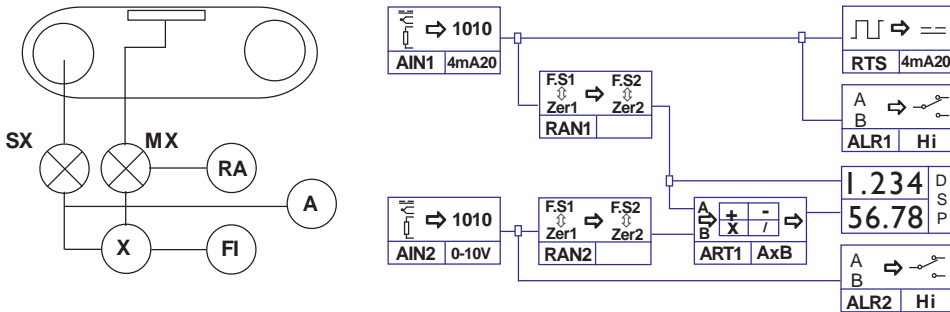
The applications of Smart Ind are limitless. The flexibility built in to each software module lets the user to integrate many functions into one instrument saving panel space, money and time. Few typical applications given below will help you realize the Power of Smart Ind.

Boiler Temperature & Steam Flow Indicator with alarms



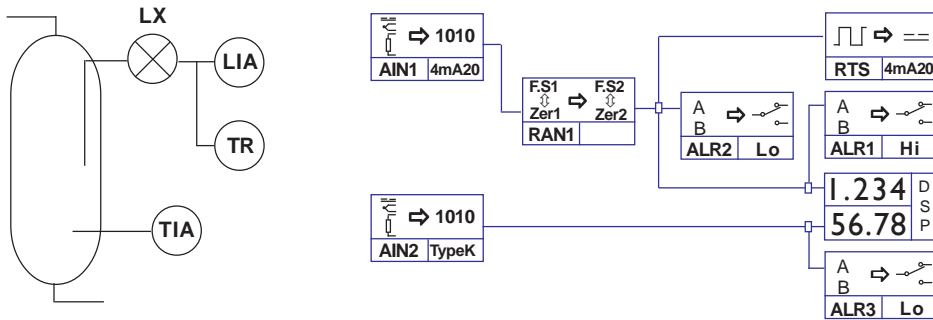
Flow chart illustrates the multiple functions executed by a single instrument Smart Ind. The functions are Indicator with alarm, Flow Indicator with alarm with retransmission of Square root output to a recorder.

Conveyor Throughput Monitor



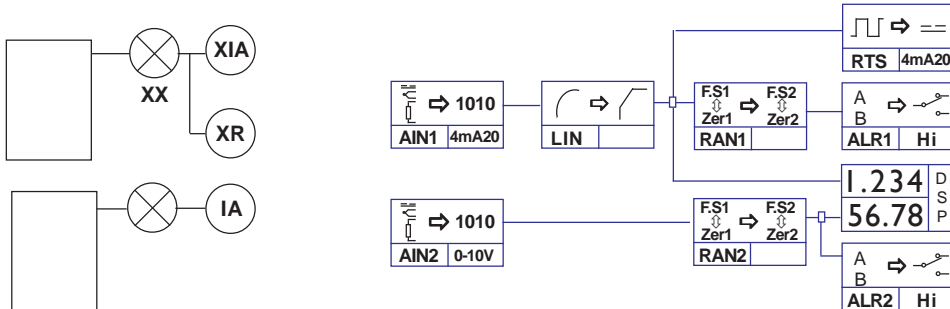
Smart Ind does the functions of conveyor mass low alarm, Mass retransmission, throughput indicator and conveyor speed alarm.

Reactor level and Temperature Indicator with alarms.



Here Smart Ind powers the Two wire type Level Tx, Indicates level, retransmit level and activates two alarm contacts on low & high conditions. Lower display indicates the reactor temperature and gives low alarm if temperature falls.

Linearised indicator for a nonlinear transducer.



mV i/p from a Transducer is linearised and ranged to give the process value in engineering units and a retransmission O/P is available for recorder. The second channel of Smart Ind Powers a Two-wire Tx and displays the process value in engineering units.

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