

## FEATURES

- ✦ **Universal Inputs - mA, Volt, pulse .**
- ✦ **Programmable Batching control .**
- ✦ **On-Off / Continuous control outputs.**
- ✦ **Dual 6 digit programmable Totaliser.**
- ✦ **Battery backed totaliser counters.**
- ✦ **Fully front panel programmable.**
- ✦ **Tamper proof Software Calibration.**
- ✦ **Wide supply tolerance - 90 to 270V.**



## About *Smart Tot Σ +* . . . .

***Smart Tot Sigma plus*** batching controller/totaliser from the cerebrum series of Smart Instruments, is designed to provide customised solutions to your batch control and totalising applications. This micro controller based instrument, has special hardware for implementing batch control. Two optically isolated contact inputs are provided for batch start and abort operations. Two input channels, a pair of contact outputs and an isolated analog output are the standard features of the hardware. A dual six digit LED display is provided for totaliser or flow rate indication. On line battery backup retains totaliser contents during power failure.

### ***One model and many applications....***

Sigma plus can perform batching control with programmable control output profile, to get accurate and repeatable batches. Sigma plus offers you choice of control outputs to suit any type of end control element-solenoid valve, I/P

converter, or motorised actuator. Sigma plus can also function as a dual channel totaliser. Sigma plus has a set of powerful software modules performing many diversified functions like Sq.Rooting, Resolution setting, Ranging, Count rate setting, Batching profile, Filtering flow noises, Averaging, etc. Soft wiring these modules suitably will convert Sigma plus in to a customised instrument fitting any given application.

### ***Flexibility - hardware to software....***

The hardware of Sigma plus has been designed to offer many universal features. Wide supply voltage tolerance, software selection of outputs as voltage/current, Dual channel totalising capability, compatibility to all types of flow signals are some of them. With the special functional modules Sigma plus can indicate two more additional variables temporarily on the same display. Sigma plus can be powered by either of the power line standards 110V , 220V AC.

# PERFORMANCE SPECIFICATIONS

## POWER SUPPLY

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

- a. 220V      b. 230V      c. 240V      d. 110V

## INPUT : Primary & Auxiliary (Channels 1 & 2)

- Filter** : User configurable Digital filter.  
**Impedance** : 470KΩ min for Voltage inputs.  
 6Ω max for mA inputs.  
**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.

## Basic Ranges<sup>1</sup>

Type	Range	Limits	Accuracy % FS
V1	0 to ±2 V	±40V	±0.25
V2	0 to ±10 V	±40V	±0.1
mA1	0 to ±4 mA	±40mA	±0.25
mA2	0 to ±20 mA	±40mA	±0.1
Ohms <sup>2</sup>	0 to 400 Ω	±10V	±0.1

**Note 1:** User can define any range confined within the limits of the Basic range. However Accuracies refer to the Full Scale of Basic Range.

**Note 2:** For position feed back from motorised actuator (One channel only)

## INPUT : Pulse

- Sensitivity** : 3 Volts (peak) minimum.  
**Isolation** : Opto isolated from Analog inputs and output.

Type	Range	Limits	Accuracy % FS
Pulse <sup>3</sup>	0.13 to 10,000Hz	±24V	±0.1

**Note 3:** Conditioned pulse inputs are only accepted. Eg. outputs of Pulse Amplifiers, Turbine Flow Transmitters etc.,.

## INPUT : Contacts

Two nos potential free N/O contact inputs with 100Ω max on resistance for batching control.

## TOTALISER MODULES

- Backup** : On-line charged Ni-Cd battery backed Totaliser counters.  
**Reset** : Can be reset from front panel.

## Pulse Totaliser ( PTOT )

- Scaling** : Totalised Engg. unit / pulse(s) is software configurable

## Analog Input Totaliser ( TOT1, TOT2 )

- Resolution** : Configurable upto three decimals.

## Batching controller outputs

On / Off, Linear, Open / Close for actuators. Software configurable.

## DISPLAY

- Type** : Dual - 6 digit / 8 mm LED display  
**Range** : -1999 to 999999.  
**Resolution** : one LSD.  
**Temporary Display** : Up to two variables can be viewed ( Choice by software )

## ANALOG OUTPUT

- 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 / Count.  
**Setting** : Can be set directly in engineering units or in % by software.  
**Output** : Two change over contacts 220V AC / DC 1 Amp (non inductive).

# GENERAL SPECIFICATIONS

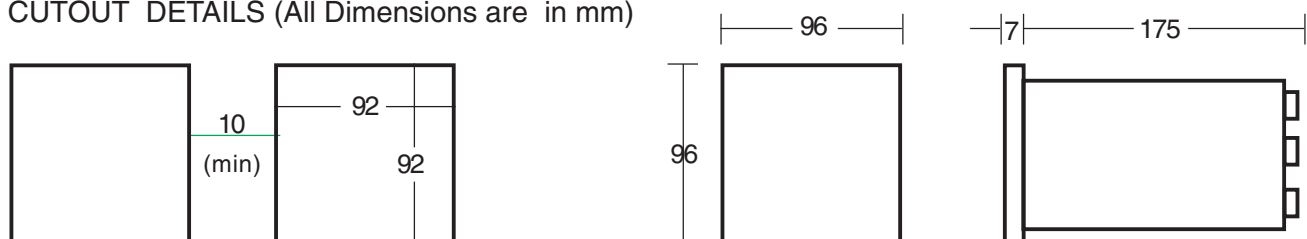
## DIMENSIONS

- 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 % (Non condensing)

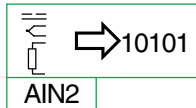
## CUTOUT DETAILS (All Dimensions are in mm)



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

# SOFTWARE MODULES

Programming Smart Tot  $\Sigma+$  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 Tot  $\Sigma+$  through the front panel key board. Brief functional details of the software modules are given below.



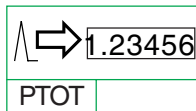
### Analog Input Modules - 2

Condition analog inputs like mA, Volts, in to 0-100% software output.



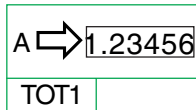
### Pulse to Linear Module - 1

Accepts pulse input from Turbine flow meters and converts it into rate of flow output ( in engineering units).



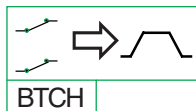
### Pulse Totaliser Module - 1

Accepts pulse input from Turbine flow meters and totalises them to give quantized output in engg. units.



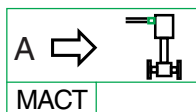
### Totaliser Modules - 2

Accepts soft wired input representing rate of flow and totalises it.



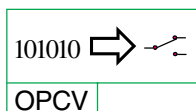
### Batching Module - 1

Performs Batching control as per customer defined control profile. It has Batch Start & Abort inputs.



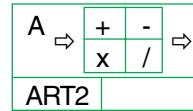
### Motorised Actuator Module-1

Controls motorised actuator with open & close contact outputs.



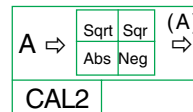
### Output convertor - 1

Module meant for batching with ON - OFF control on devices like solenoid valves.



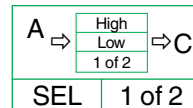
### Arithmetic Modules - 2

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 :  $C1 \times (-A) + C2$



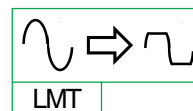
### Select Module - 1

Selects & outputs Hi / Lo / 1 of 2 inputs as programmed by the user.



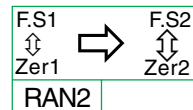
### Characteriser - 1

Characterises the output from a non linear device such as 'V' notch, for open channel flow measurement.



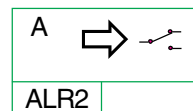
### Limiting Module - 1

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



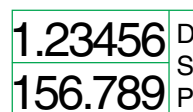
### Ranging Modules - 2

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



### Alarm Modules - 2

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 6 digit LED display which can indicate -1999 to 999999. Resolution is user settable.



### Analog output Module - 1

Gives isolated 4-20mA / 0-20mA / 0-5V / 1-5V / 0-10V output depending on the user's selection.

## ORDERING INFO

### Model : Smart Tot $\Sigma+$

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

### MEDICAL & CONTROL INSTRUMENTS HOUSE (I) PVT. LTD

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