Zero Speed Switch: Series ESM

SMARTsaa offers Zero Speed Switch to monitor speed of conveyers, crushers, rolling mills, agitators, mixers, stirrers, screw conveyers, bucket elevators and other industrial machinery. The device actuates relay contacts when equipment speed reduces below set value. By using this contact equipment overload, under speed, Zero Speed can be detected.
Speed sensor is placed in close proximity of the rotating object. On this object, metallic plates are fixed. Sensor detects presence of metal objects which come within the range of their oscillating field giving rise to corresponding pulses. These pulses are fed to the control unit where they are compared with the standard pulses to sense the speed. Output is in the form of relay contact.
Provided with in built initial by-pass timer to bypass the switch while starting the equipment. This delay is provided to allow the rotating machinery to attend the desired speed. If after this set time the motor does not attend the set speed, the relay is de-energized. If the equipment speed crosses above the set value, the O/P relay remains energized. The relay de energies when the equipment speed reduces set value.
The zero speed circuit is designed considering fail safe operation. In any fault condition like sensor fail, no power to the switch, cable fault, zero / under speed the relay reenergizes tripping the equipment.
Please specify equipment RPM when running at healthy speed and select required speed range for proper functioning.

SPECIFICATIONS: ESM: Below specification are for typical **ESM 1 W 3 S 1 S 1 P** 1. Please refer Name Plate on switch, Ordering Proforma, Ordered Specifications and Test Certificate for exact details.

- Duty : Under Speed Monitoring
- Control Supply : 110/230 VAC site selectable.
- Enclosure for control unit: Cast Al, IP 65, Field Mounting. Other enclosures like Din Rail Mounting / Flameproof Type / Polycarbonate Type for use in corrosive Area are also available
- Control O/P : 2 NO + 2 NC Potential free Relay Contact
- Speed Range : Please select required speed range.
- Speed setting : By potentiometer
- Contact rating : 5 Amp. Resistive at 230 V AC
- Pulses/Rotation : Depends on the selected speed range. Please refer the name plate on equipment
- With built-in initial by-pass delay facility of 3-30 Secs.
- Cable Entries : 3 Nos. (2 No: 3/4 inch, 1 No : PG 9 for sensor)
- Enclosure : Field Mounting, IP 65, Powder Coated, Paint shade: Light Grey, Shade 631 As per IS -5
- Sensor Probe : Inductive Type, M30, with 2 Mtr , 3 core , PVC ,cable,
- Sensing Range 10-12 mm, Effective: 7-10 mm
- Other sensors are also available



ESM Cast Al



Cast Al, Cover Open



Polycarbonate Enclosure



Din Rail Type



Flameproof Enclosure

SMARTsaa Instruments (I) Pvt. Ltd.

(Formerly Smart Sensors And Automations & Protocontrol Instruments (I) Pvt. Ltd.)

E-12, Mangalmurti Industrial Complex, Plot T-80, Industrial Area, MIDC, Bhosari, Pune : 411026. India

www.smartsaa.com, Email : sales@smartsaa.com, info@smartsaa.com, Ph.: 020 27400973 Mob. : 8055169703, 8055169702

Zero Speed Switch: Series ESM

ORDERING PROFORMA

Zero Speed Switch: Series ESM

Series	Gr. I	Gr. II	Gr. III	Gr. IV	Gr. V	Gr.VI	Gr. VII	Gr. VIII	Gr. IX	Gr. X	Typical Ordering Code
ESM	1	W	3	S	1	S	1	P			ESM 1 W 3 S 1 S 1 P

Group: I: Application

Zero Speed / Under Speed Monitoring	1

Gr II : Enclosure for Control Unit

Din Rail Mounting (35 mm), Safe area use,	R
Din Rail Mounting (35 mm) Intrinsically safe circuit, IP 30	N
Cast Al , IP 65	W
DMC/ SMC /ABS Plastic/ Polycarbonate Corrosion Resistant, IP 65	P
Flame Proof, Field Mounting IP65 (Sensor Group must be N)	F

Group: III: Speed Range

1-10 RPM , 8 Flags	1
5-50 RPM, 4 Flags	2
10-100 RPM, 4 Flags	3
100-1000 RPM, 4 Flags	4
50-500 RPM, 4 Flags	5
500-5000 RPM, 2 Flags	6
1000-10000 RPM, 2 Flags	7
Other, Please Specify	8
5-5000 RPM by speed range selector switch	9

Group: IV: Sensor Probe:

Tubular threaded, with two check nuts, Ni Chrome Plated Brass
With 2 Mtr 3 core PVC cable

M30 Sensing range 10-12 mm nominal, 8-10 mm operational	S
M50 Sensing range 15-17 mm nominal, 12-15 mm operational	E
M70 Sensing range 25-30 mm nominal, 20-25 mm operational	H
Intrinsically Safe, For Use in hazardous area, M30 Sensing 10-12 mm	N
Intrinsically safe, other than M30	NO
Other, Please Specify	O

Group: V: Time Delay

Tubular threaded, with two check nuts, Ni Chrome Plated Brass
With 2 Mtr 3 core PVC cable

Initial Time Delay (3-30 sec)	1
Nuisance Time Delay with Initial Time Delay	2

Group: VI: Control Supply Voltage

110/230 V AC, 50 Hz	S
230 V AC, 50 Hz	T
110 V AC, 50 Hz	V
24 V DC	U

Group VII: Out Put Contacts

2 NO+ 2 NC, 5 Amp	1
2 NO+2 NC, 10 Amp	4
Other , Specify	5

Group VIII: Setting

Potentiometric	P

Group IX: Optional Facility

No optional Facility	No adder

Group X: Additional Accessories

No additional Accessories	No adder
Extra Junction Box for sensor	JB
Sensor probe with Flag Assembly	F
Mounting Bracket for Sensor	MS
Mounting Plate for Control Unit	MP
Cable Gland for Control Unit, Double Compression Type, ¾ inch, BSP, Brass, 2 Nos, WP	CG

SMARTsaa Instruments (I) Pvt. Ltd.
(Formerly Smart Sensors And Automations & Protocontrol Instruments (I) Pvt. Ltd.)
E-12, Mangalmurti Industrial Complex, Plot T-80, Industrial Area, MIDC, Bhosari, Pune : 411026. India
www.smartsaa.com, Email : sales@smartsaa.com, info@smartsaa.com, Ph.: 020 27400973 Mob. : 8055169703, 8055169702

Installation Guide for Zero Speed Switch: Series ESM

Thank you for choosing SMARTsaa Zero Speed Switch. It is best product designed considering adverse industrial application. Please read below for easy and effective commissioning of SMARTsaa ESM.

STANDARD OPERATION OF ZERO SPEED SWITCH

The zero speed consists of

1. Speed Sensor
2. Control Unit

The Speed sensor is to be installed in front of rotating shaft on which required number of flags (Metallic Pieces of specified size and dimension) are welded.

The speed sensor senses metallic flag and these pulses are fed to control unit. The control unit compares these pulses with set speed set by speed setting knob. When equipment speed drops below set value the relay trips (de-energies). The O/P contacts are interlocked in control circuit and the equipment trips.

The Speed Switch is provided with initial bypass time delay; this allows the equipment to achieve normal speed. The zero speed switch is in bypassed mode. The O/P relay remains energized (ON) condition in this duration.

STANDARD WIRING AND INTERLOCKING PRACTISE OF ZERO SPEED SWITCH

1. Power the ZSS when you start the equipment. The ZSS must be powered at the same time when the equipment is powered. This allows equipment to start from zero to achieve normal healthy speed in specified time. This is done ideally by using NO contact of motor contactor to power the ZSS. When equipment is ON, ZSS should get power at the same time.
2. Wire NO contact of ZSS in interlocking circuit. Ideally, NO contacts are wired in place of “Hold On” contact of contactor. Please refer “Typical Wiring Diagram” of ZSS. **Always try to design control circuit “With Built In Initial Bypass Timer”** i.e. by using ESM built in initial bypass timer.
3. The ZSS, NO contact will remain closed when
   a. ZSS is powered and initial bypass time delay duration is in process
   b. The equipment is running above set speed
4. As the ZSS is designed with failsafe circuit, the ZSS will trip when
   a. The equipment does not achieve set speed even after initial bypass time set by “Time” potentiometer is over
   b. The equipment speed reduces below set RPM set by “Speed” potentiometer
   c. Sensor is not sensing the flag (the gap between sensor and flag is more that sensor sensing distance). The LED at the back of the sensor should flicker when flag passes in front of sensor probe. Adjust the sensor and flag gap such that sensor senses each flag properly.
   d. Sensor malfunctioning. The Sense led on ZSS controller does not flicker when equipment is rotating.
   e. Sensor cable open. The Sense led on ZSS controller does not flicker when equipment is rotating
   f. ZSS supply is interrupted. The supply LED on ZSS should be ON continuously.
   g. ZSS control circuit is damaged

HOW TO CHECK ZSS WORKING ON TABLE BEFORE INSTALLATION AT SITE

1. Give specified supply to the ZSS, the “SUP” LED on ZSS controller should get ON.
2. When ZSS is given supply, immediately “RLY” led should get on. The relay contacts will change over. The NO contact of ZSS will get closed. P1 and NO1 and P2 and NO2 will get closed.
3. Wait till initial bypass time delay is over. Do not bring any metallic object in front of sensor in this time. After initial bypass time (ITD) is over and no flag is moving in front of sensor, the relay will de-energize. The RLY led will get off. The P1 and NO1 and P2 and NO2 will get open.

SMARTsaa Instruments (I) Pvt. Ltd.
(Formerly Smart Sensors And Automations & Protocontrol Instruments (I) Pvt. Ltd.)
E-12, Mangalmurti Industrial Complex, Plot T-80, Industrial Area, MIDC, Bhosari, Pune : 411026. India
www.smartsaa.com, Email : sales@smartsaa.com, info@smartsaa.com, Ph.: 020 27400973 Mob. : 8055169703, 8055169702

4. Now repeat the process by varying the Time (ITD pot). The ITD time should vary. When time setting should increase when" Time" pot is varied from 1 to 10.
5. Now check the working of Speed pot. Give supply to ZSS. Let the ITD time gets over. Keep the SPEED potentiometer at minimum. Now hold sensor in hand and bring any metallic piece like screwdriver in front of sensor. The led at the back of sensor as well as "SIG" led on ZSS controller will get on. Repeat this process to observe the LEDs are fluctuating.
6. Now by keeping speed potentiometer at minimum, now increase the speed of operating (giving pulses manually) the sensor, if your pulse speed exceeds set speed on "SPEED" dial, the RLY led will glow and relay will get energized. This indicates that the pulse speed is higher that the set speed and ZSS is experiencing healthy speed. The relay will remain energized till your pulse speed is high.
7. Now stop giving pulses, the RLY will get off, the relay will get de energized (Off).
8. Repeat the procedure, by adjusting "SPEED" potentiometer. You can do this until your pulse rate achieved by hand is above the set speed. You may not achieve relay operation when speed sett is at max value.
9. This indicates that ZSS is working fine.

HOW TO ENSURE PROPER INSTALLATION OF ZSS AT SITE

SENSOR INDTALLATION:

1. Install sensor probe securely at site
2. Provide specified number of flags on moving shaft. Please refer ZSS name plate and check: "Calibrated For " if it specifies 4, provide 4 flags on moving object.
3. Ensure proper gap between sensor probe and flag
4. Ensure flag is not touching to the sensor face. If flag hits the sensor face, the sensor will get damaged
5. Flag material: Mild Steel, for getting specified sensing distance. If it is other than MS sensing distance will reduce
6. Flag Size: The flag plate size should be at least equal than diameter of the sensor and thickness more than 2 mm
7. Ensure proper wiring. + Ve wire: Red wire of sensor probe, - Ve: Black wire of sensor probe, I/P: Green wire of sensor probe.
8. When powered, the sensor LED should flicker when object is passing in front of sensor.
9. If you are using sensor supplied by other vendor use NPN sensor, working at 12 V DC

CONTROLLER INSTALLATION:

1. Properly install the ZSS controller at site on base plate
2. Wire the Sensor Terminals
3. Wire the O/P contact terminals
4. Give specified control supply to the ZSS: The "SUP" led should glow
5. When equipment is running the "SIG "led will flicker
6. If equipment speed is above set speed of ZSS the RLY led will get ON. Relay will get energized.
7. When equipment speed is reduced below set RPM, the RLY led will get off, relay de-energizes.
8. The RLY will get off at any fault condition like sensor fail, cable open, power supply interruption etc.
9. **Initially keep TIME potentiometer to maximum and SPEED potentiometer to minimum.**
10. After few operations, you can set SPEED potentiometric to required value. Refer speed setting range mentioned on the equipment name plate. If your speed range is 10 – 100 RPM, the setting 1 on SPEED potentiometer approximately achieves 10 RPM and setting 10 on SPEED potentiometer approximately achieves 100 RPM.
    If name plate specifies speed range of 50 – 500 RPM, the setting 1 on SPEED potentiometer approximately achieves 50 RPM and setting 10 on SPEED potentiometer approximately achieves 500 RPM.
11. Close the ZSS controller cover properly. Ensure proper glanding for better sealing against water and dust.
12. PG9 gland is to be used for wiring sensor probe

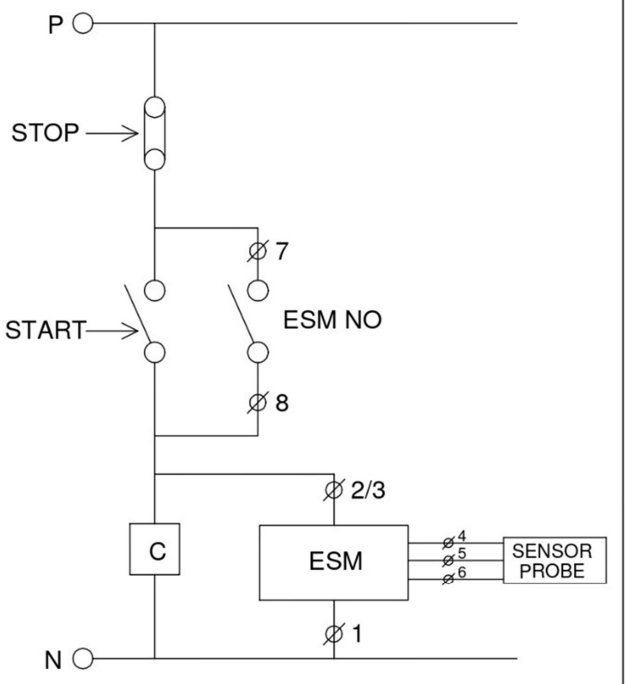
FAULT FINDING:

1. ZSS is not getting supply: Ensure proper control supply. Use proper terminals to wire 110 V or 230 V
2. SIG led is not flickering, Check sensing gap. Ensure proper gap. Adjust gap if required. Check sensor.
3. **If you are using sensor supplied by other vendors, use NPN sensors working at 12 V DC**

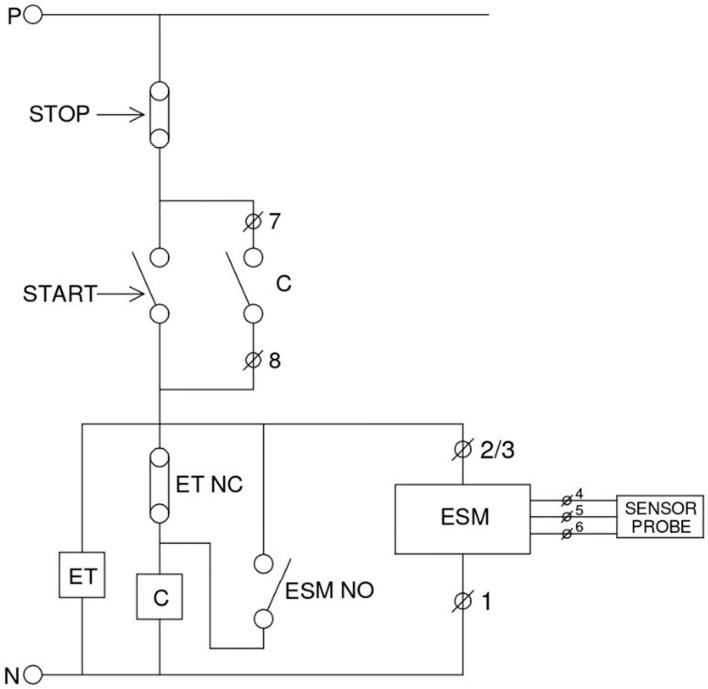
4. **My equipment speed is 7 RPM, I wrongly ordered ZSS with 10-100 RPM calibrated at 4 pulses per rotation, how do I use same ZSS ?**
   As ordered ZSS minimum settable speed is 10 RPM, by changing number of flags at site you can use same controller. Now to use same controller, weld 8 flags on equipment, set 1 on SPEED potentiometer, even though the equipment speed is 7 RPM, as the number of flags are changed to 8, now the ZSS will receive pulses corresponding to 14 RPM. If you set SPEED potentiometer to 1. You can use same controller.
5. Always use NO contact of ZSS for interlocking in your control circuit. Refer typical wiring diagram as shown.

TYPICAL WIRING DIAGRAM

WITH BUILT IN INITIAL BYPASS TIMER



WITH EXTERNAL ON DELAY TIMER



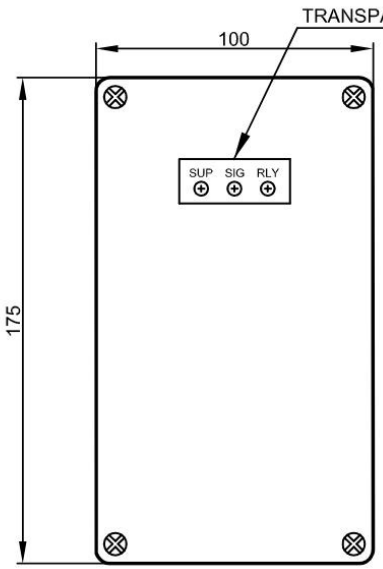
C = MOTOR CONTACTOR ET = ON DELAY TIMER ESM = ELECTRONIC SPEED MONITOR

SMARTsaa Instruments (I) Pvt. Ltd.

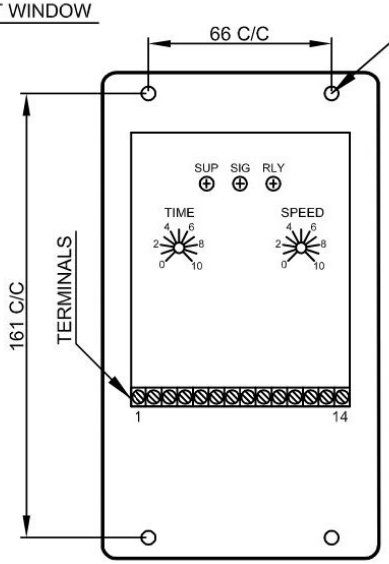
(Formerly Smart Sensors And Automations & Protocontrol Instruments (I) Pvt. Ltd.)

E-12, Mangalmurti Industrial Complex, Plot T-80, Industrial Area, MIDC, Bhosari, Pune : 411026. India

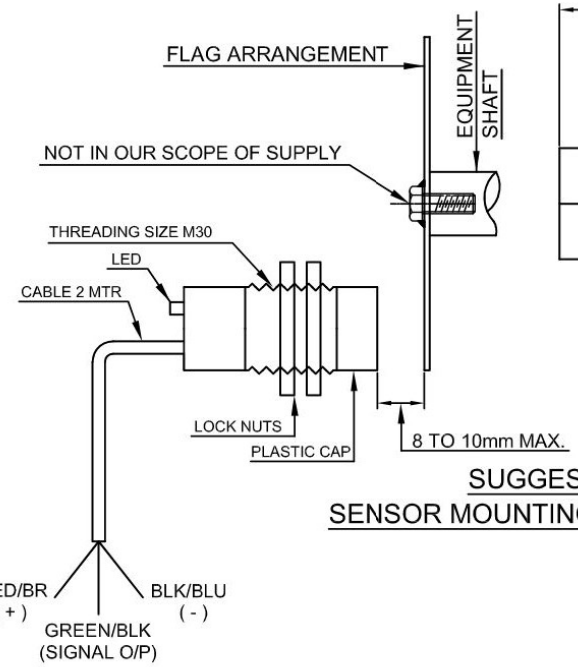
www.smartsaa.com, Email : sales@smartsaa.com, info@smartsaa.com, Ph.: 020 27400973 Mob. : 8055169703, 8055169702



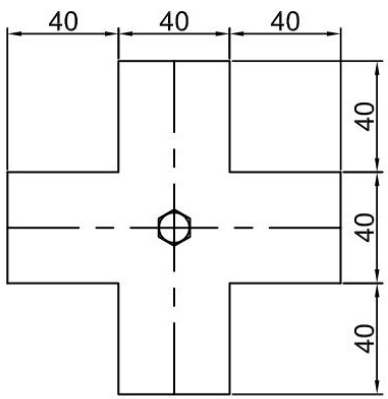
FRONT VIEW WITH COVER



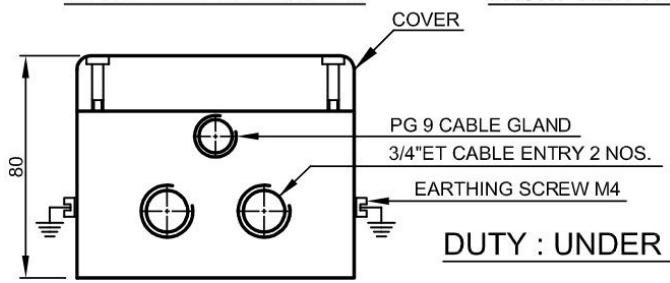
FRONT VIEW WITHOUT COVER



SUGGESTED
SENSOR MOUNTING ARRANGEMENT



FLAGS (4 NOS.)



BOTTOM VIEW

DUTY : UNDER SPEED / ZERO SPEED MONITOR

TERMINAL DIAGRAM													
SUPPLY			SENSOR			RELAY							
0	110	230	+	I/P	—	P1	NO1	P1	NC1	P2	NO2	P2	NC2
1	2	3	4	5	6	7	8	9	10	11	12	13	14

ALL DIMENSIONS ARE IN mm

	MATERIAL	FINISH	PROTECTION
MONITORING UNIT	CAST AL	LIGHT GRAY	IP 65
SENSOR PROBE	BRASS	PLATED	IP 67

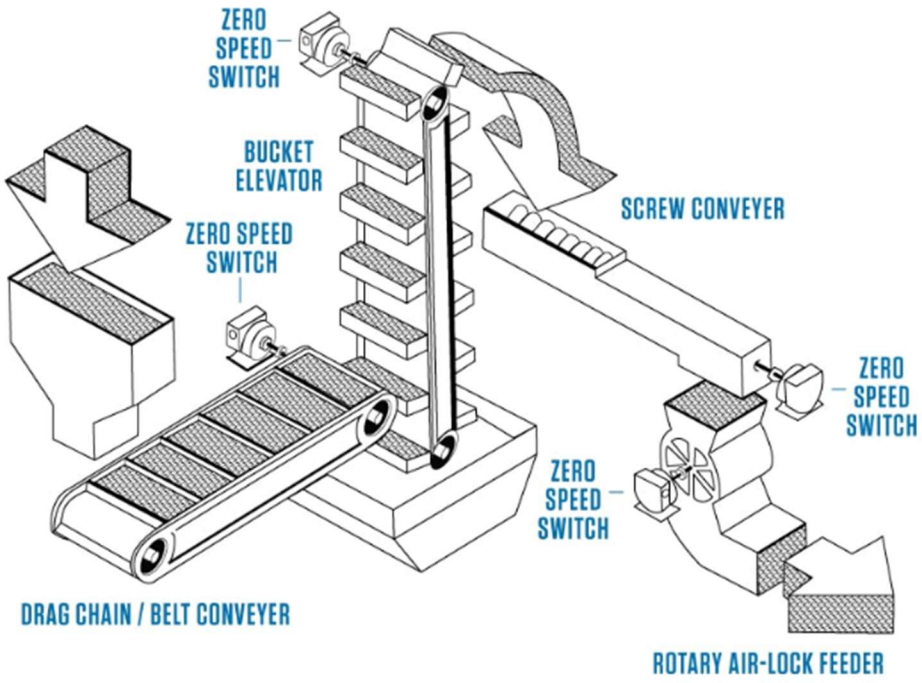
SPEED RANGE RPM	NO. OF FLAGS	
10-100	4	FLAG SIZE & DISTANCE BETWEEN TWO FLAGS SHOULD BE EQUAL TO THE SENSOR DIAMETER.

TOL. : OVERALL DIMENSIONS +/- 5mm.& ON MOUNTING CENTRE DISTANCE +/- 3mm.

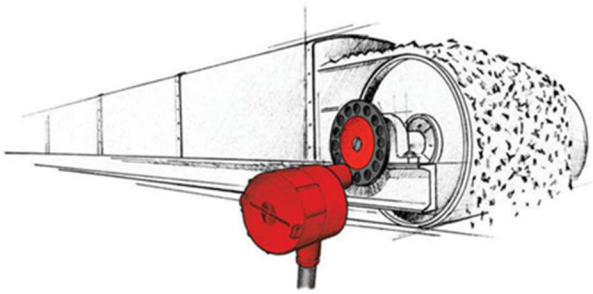
SMART SENSORS AND AUTOMATIONS
E-12, Mangalmurti Ind.Complex, Bhosari
Pune : 411026 Mob. 7028376392, email : sales@smartsaa.com

DRN BY : SUDHAKAR	TITLE : **ELECRONIC SPEED MONITOR WITH DUST TIGHT BOX (CAST AL.)**	
APPD BY :		
DATE : 01/06/2020	DRG.NO : CD200650	TYPE : ESM-1-W-3-S-1-S-1-P
SCALE : 1:1	REV :	DATE :
CUSTOMER REF :		

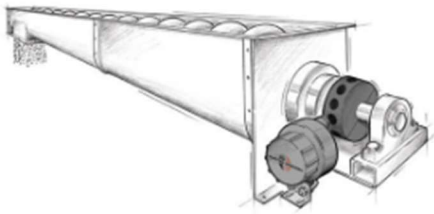
APPLICATION EXAMPLES OF ZSS



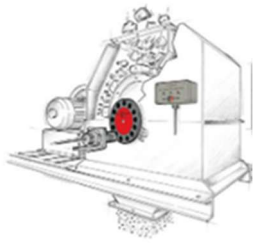
SENSOR MOUNTING



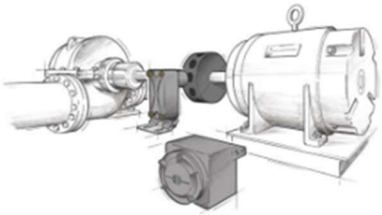
Belt Conveyor



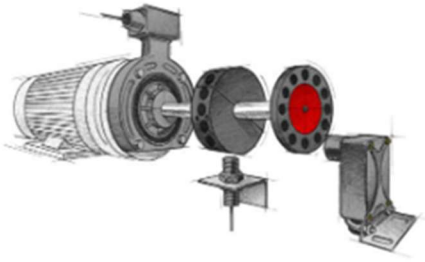
Screw Conveyor



Crusher



Pump



Centrifuge

For further detail, please contact:

SMARTsaa Instruments (I) Pvt. Ltd.

(Formerly Smart Sensors And Automations & Protocontrol Instruments (I) Pvt. Ltd.)

E-12, Mangalmurti Industrial Complex, Plot T-80, Industrial Area, MIDC, Bhosari, Pune : 411026. India

www.smartsaa.com, Email : sales@smartsaa.com, info@smartsaa.com, Ph.: 020 27400973 Mob. : 8055169703, 8055169702

SMARTsaa Proto Control

ADDITIONAL MODELS OF ZSS

Please ask for detailed catalogue / Datasheet of required model

FIELD MOUNTING / DIGITAL DISPLAY MODELS



POLYCARBONATE



POLYCARBONATE



CAST AL



CAST AL FLAMEPROOF

PANEL MOUNTING/ DIGITAL DISPLAY MODELS



ONLY INDICATOR / TACHOMETER
Front Panel Mounting



WITH 4-20 mA / MODBUS Re Tx. O/P
Back Panel Mounting



DIN RAIL DIGITAL

ZERO SPEED SWITCH IN SENSOR HOUSING



ESM B2

ADDITIONAL SENSOR TYPES



M80



SQUARE



CAST AL

SMARTsaa Instruments (I) Pvt. Ltd.
(Formerly Smart Sensors And Automations & Protocontrol Instruments (I) Pvt. Ltd.)
E-12, Mangalmurti Industrial Complex, Plot T-80, Industrial Area, MIDC, Bhosari, Pune : 411026. India
www.smartsaa.com, Email : sales@smartsaa.com, info@smartsaa.com, Ph.: 020 27400973 Mob. : 8055169703, 8055169702