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Panel mounting process indicator / controller

INTUITIVE-OEE

OEE, TAKT, Availability, Quality & Performance monitor

Digital Scaling and calibration
User friendly, time-saving design
Fast installation and commissioning



General Description

The INTUITIVE-OEE is a user friendly and affordable solution wherever production line performance metrics needs to be monitored automatically.

It displays these important parameters:

- OEE (Overall Equipment Effectiveness)
- Takt (Dynamic Target)
- % Reject rate (Quality)
- % Availability
- Line Speed (items per hour, minute, or second.)
- Line Total
- Reject Total

Scroll through each metric, to see at a glance how your line is performing. We store the previous 4 histories for each metric. To see past shift performances, press the button you wish to view for a few seconds, you will see a number appear in the left hand digit position, to show how far back the history is. Press that button briefly to see previous histories.

For example if you see  for OEE, then 2 shifts ago, the OEE was 63.5

It is small, so can be easily added to any part of a compound production line.

It accepts most common sensors -

Input 1 accepts Proximity, contact closure, optical, magnetic etc.

Input 2 accepts Proximity, contact closure or optical sensors only.

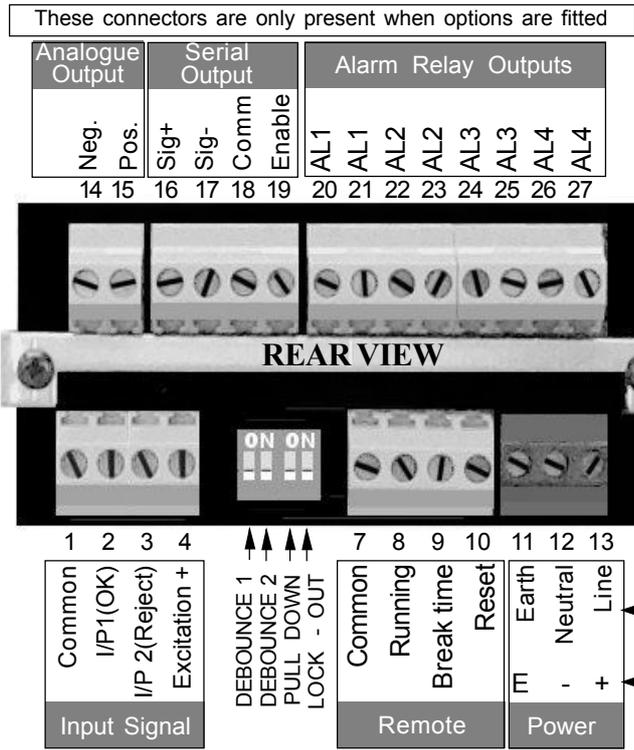
It can be expanded, to include large digit public displays, alarm relay outputs, data output etc.

It is flexible, having an open software architecture. If it doesn't do exactly what you want you want of it, let us know what you need. Chances are we can add your desired features.

Size:	Industry standard 1/8 DIN enclosure
Visibility:	7 metres digit legibility (14.2mm digit height)
Power:	95-265 VAC or 11-30 VDC as an option
Input Signals:	Contact closures, NPN, PNP proximity sensors
Count memory:	10 year retention

Please Note: Behaviour may change without notice, as the product develops.

Connections



The ON position is marked on the switch and may differ with different manufacturers.

The LOCKOUT switch *must* be set ON when settings are complete

Serial Output Connection Notes

1) RS232 option type

The RS232 data appears on terminal 16
 Data common on terminal 18
 RTS on terminal 19
 Pullup on terminal 17

To produce a continuous stream of data, connect terminals 17 and 19 together, or, for one-shot transmissions, apply a single pulse of 5V level to terminal 19.

2) RS422 option type

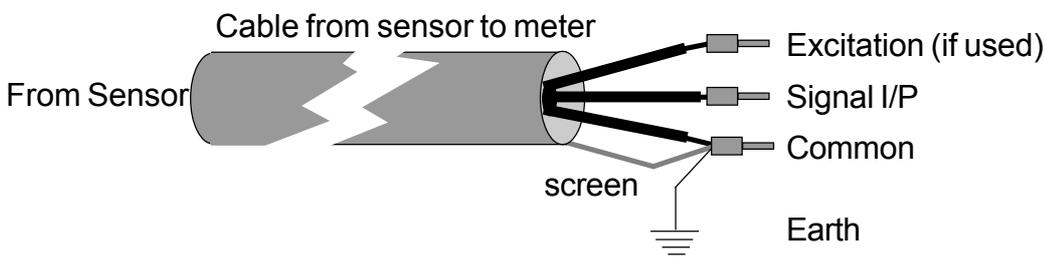
The RS422 data appears on terminals 16 and 17. Common is on terminal 18.

To produce a continuous stream of data, connect terminals 18 and 19 together, or, for one-shot transmissions, apply a single pulse of 0V level to terminal 19

How to install input signal cabling :-

This meter responds to pulse signals. It is important that only wanted pulses are applied to the meter, not noise pulses, or your readings will have errors. Some rules are...

- 1) Always use screened cable for the input signal.
- 2) Connect the screen at one end only, preferable at the meter end.
- 3) Do not place input cable near power cable or alarm relay cabling.



How we calculate OEE

We measure 3 key variables on the line, and multiply their values to obtain OEE ...

<p>Production Line Availability</p> <p>0.000 to 1.000 = 0-100.0%</p> <p>If the line has run for 3 hours out of a possible 4 hours, the Availability is 0.750 or 75.0%</p> <p>Can be flagged by the line running/stopped contact, or by product not appearing for a predetermined (selectable) amount of time.</p>	x	<p>Speed performance</p> <p>0.000 to 2.000 = 0-200.0 %</p> <p>If the line has produced 855 items in the 3 hours it has been running, but could potentially have produced up to 1000 items in that time, the running Speed performance is 0.855 or 85.5%</p> <p>The manager will enter a value for ideal production rate, (Takt) against which actual line speed is compared.</p>	x	<p>Quality Performance</p> <p>0.000 to 1.000 = 0-100.0 %</p> <p>If 12 of the 855 items produced while the line has been running are rejected, scrapped and not reworked, the Quality performance is $855-12/855 = 0.986$ or 98.6%</p> <p>Typically one pulse per product made, one pulse per product rejected, or 1 pulse per product or package (scalable)</p>
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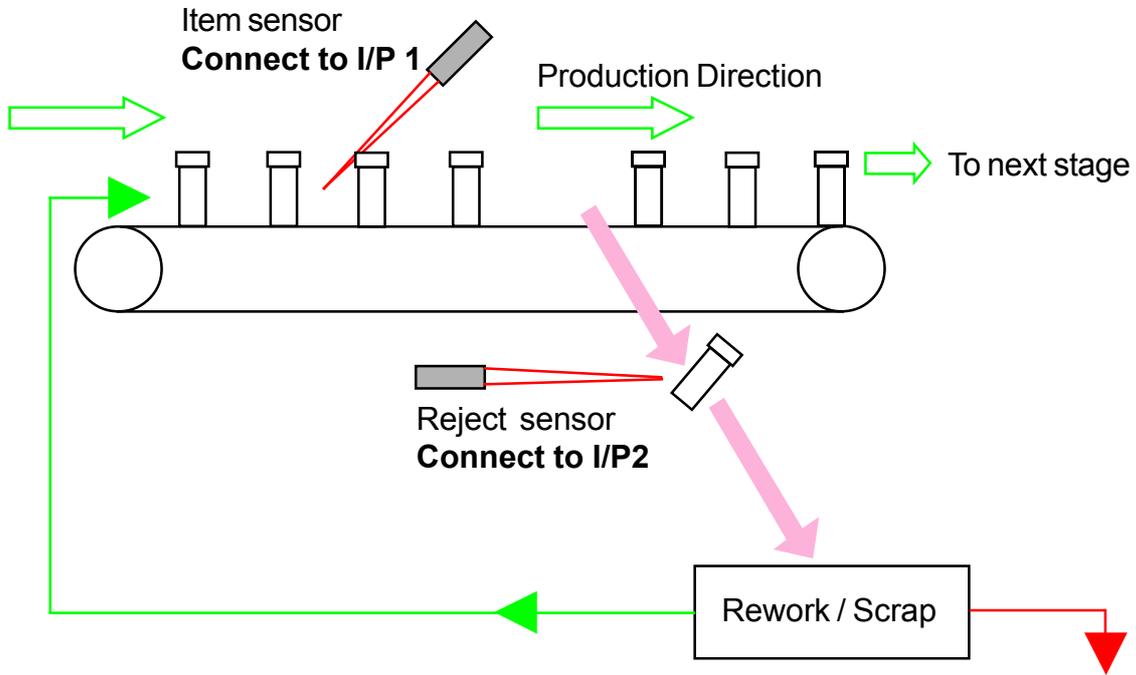
For this example, $OEE = 0.750 \times 0.855 \times 0.986 = \mathbf{0.632 = 63.2\%}$

The unit can also be set to not calculate OEE during scheduled breaks for tea, lunch etc. This is achieved with an external clock unit, which will signal starts and stops of scheduled breaks.. To signal a scheduled break, connect a contact closure between terminal 7 and 9.

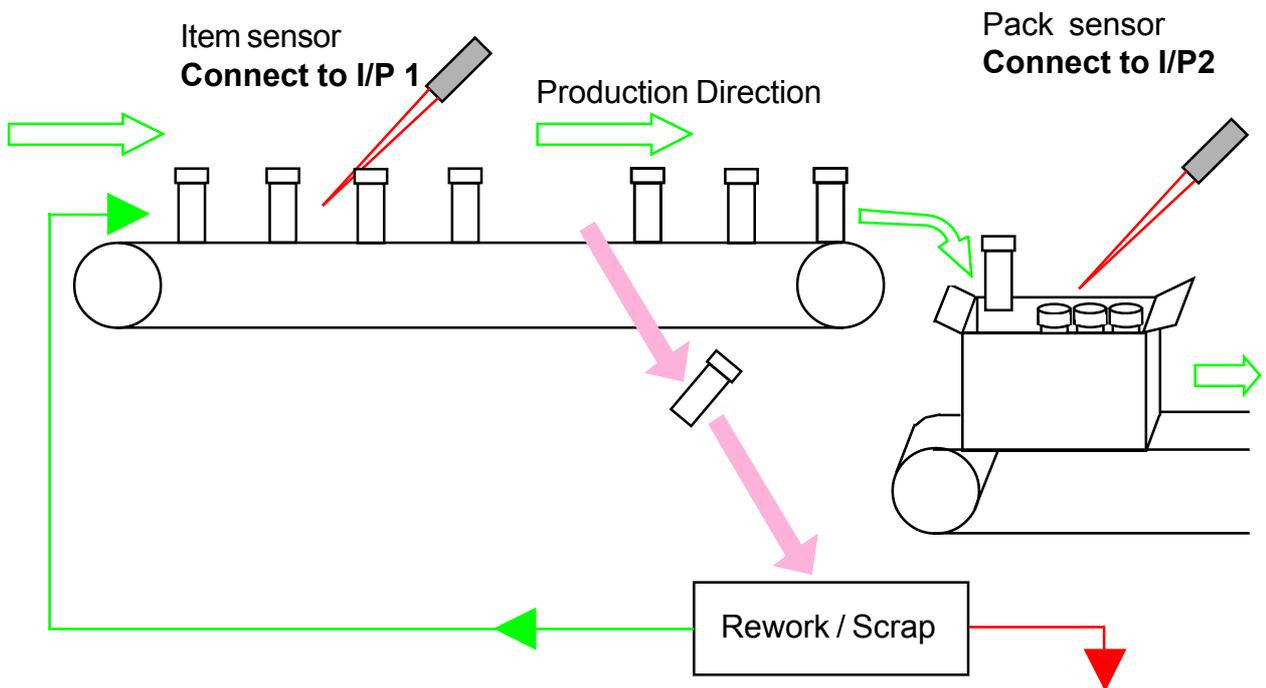
Serial output of all parameters is available, to feed large slave displays, PLC, PC or small remote displays..

Typical Sensor arrangements

A simple scheme, ideal for monitoring individual sections of a production line. For example, you could have an OEE display on the dough forming line, one on the topping sprinkler, one on the oven, one on the packing section, to monitor each section's performance. Set *REJ 2* for this function.



Instead of counting rejects, you could count product onto the line and product off the line, and calculate rejects from the difference. The meter can be told how many items you put in a pack, from 1 to 99999. You can also tell the meter how many items are on the line when the meter is first started. This system is best suited to small sections of line, or to packing areas. Set *REJ 1-2* for this function



Settings and what they mean.

To enter the settings, make sure the lockout switch is OFF. Press the left hand 'Setup' button for 3 seconds to enter setup mode. You will be able to view and edit these settings..

TAKT

Use UP/Down buttons to choose ... **PER.SEC** or **PER.MIN** or **PER.HR**
Then set the numeric value with the DIGIT key and UP/DOWN buttons. Press OK when done. This value will be used to calculate and display rate and target.

OPT.SPD

Optimum Speed. The max. possible number of items (per unit time used for Takt.) the machine could ever produce. This is the machine manufacturer's 'ideal' rate. Set the value with the DIGIT key and UP/DOWN buttons. Press OK when done

STOP.TI.

How long you will wait for a product until you assume the line has stopped. Set the value with the DIGIT key and UP/DOWN buttons. Press OK when done

SHIFT.TI. (optional if you want unit to calculate TAKT itself)

How long is a shift in working hours (excluding tea/lunch breaks)
Set the value with the DIGIT key and UP/DOWN buttons. Press OK when done

TARGET (optional if you want unit to calculate TAKT itself)

How many items you want to produce in a shift.
Set the value with the DIGIT key and UP/DOWN buttons. Press OK when done.

AVG

The averaging for rate measurement, to give a smooth reading. A bigger number will give more stable reading if production rate fluctuates.
Set the value with the DIGIT key and UP/DOWN buttons. Press OK when done

REJ

There are two ways you can measure rejects. Either count each reject as it is detected (**REJ. 2**) or subtract the final packed item total from the starting item total (**REJ 1-2**)

L-CAP

This is the Line Capacity. You can tell the meter how many items are on your line when you first install the meter, so that they are taken into account.
Will only appear in the menu if you are using **REJ 1-2**

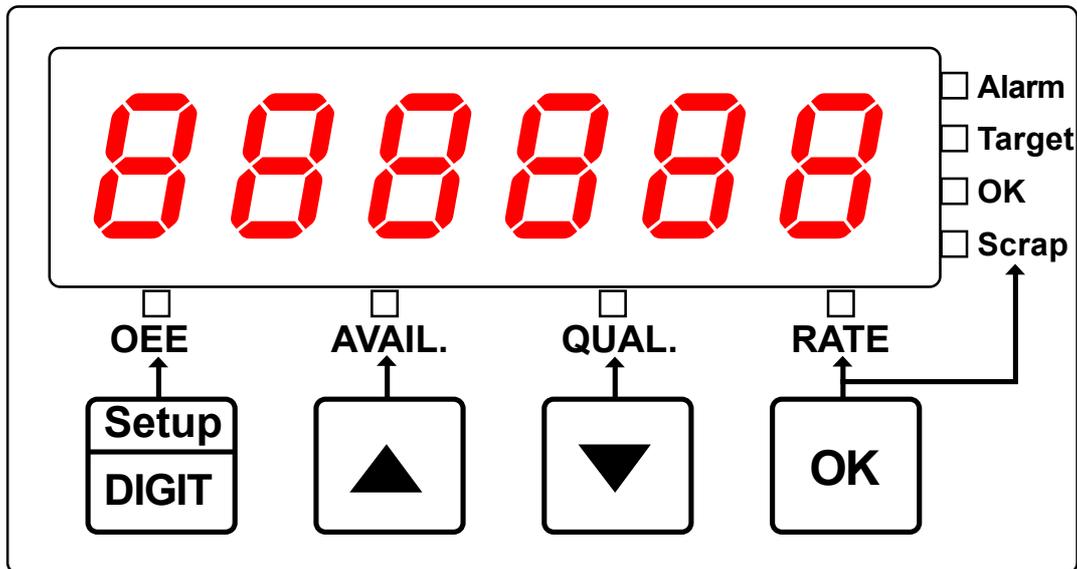
OP.SCAL

Output Scale. How many items do you put into 1 pack? Use this if you are counting packs at the end of the line, but items at the beginning.
Will only appear in the menu if you are using **REJ 1-2**

IMPORTANT:

When you have entered all your settings, move the lockout switch to its ON position.

Display formats and units



When you have moved the lockout switch to its ON position, you will be able to view all of the production measurements.

Press the front panel button for each measurement to view its value. An LED will light next to each measurement to tell you what you are viewing at any time.

The available measurements and their units of measure are:-

OEE	<i>888.8</i>	%
Machine Availability	<i>888.8</i>	%
Quality performance	<i>888.8</i>	%
Rate	<i>888888</i>	Items per hour, minute or second
Scrap	<i>888888</i>	Items
OK - good product	<i>888888</i>	Items
Takt (Target)	<i>888888</i>	Items
Alarm	<i>888888</i>	A setpoint which you can use to signal if one of the above variable falls below a preset limit.

Alarm Relay output (optional)

You can set the alarm relay to activate when one of the performance measurements goes above or below a preset limit.

To set this function, you will need to set the lockout switch to OFF.

Press the OK button for 3 seconds and you will see the alarm type. Press the UP or DOWN button to change the alarm type to suit your application...

Set **TYP.OFF** if you don't need an alarm function

Set **TYP.HI** if you want the alarm to activate if you go above the setpoint

Set **TYP.LO** if you want the alarm to activate if you go below the setpoint

Press OK when done.

You will now see **ALR.XXX** where **XXX** is the parameter you want to compare to the alarm setpoint.

The choices are:-

ALR.OEE for Comparing OEE to the setpoint

ALR.AVL for Comparing Availability to the setpoint

ALR.QAL for Comparing Quality to the setpoint

ALR.RAT for Comparing Rate to the setpoint

ALR.TOT for Comparing total Good items produced to the setpoint

ALR.SCR for Comparing total Scrap items produced to the setpoint

Use the UP or Down arrow to scroll through these choices and press OK when done.

You will now see a numeric value, with the right hand digit brighter than the others.

This is your setpoint value.

You can choose different digits to adjust with the DIGIT button.

You can change a digit's value with the UP or DOWN buttons.

Press OK when done.

Note: If you want alarms for the other performance measurements, you can add slave displays such as the model INT-S-AL2. Let us know what you want and we will help to select a suitable system for you.

Serial Data output (optional)

You may want to send your production measurement data to a PC, a slave display, a data logger or other remote device.

To do this, you can add a serial data output board.

Choose from:- RS232, RS422 or RS485

With the lockout switch off, press the 2nd button from the left for 3 seconds. Set Adr.-- with Adr.--, all measurements are sent once per second in a combined data string, as follows...

Measurement type	Format	Units	Hex value of terminators
Run time to	99999.9 R <CR>	in seconds, minutes or hours	52
Quality performance to	99999.9 Q <CR>	as a percentage	51
Speed performance to	99999.9 P <CR>	as a percentage	50
Current speed to	99999.9 C <CR>	in units per second, minute or hour	43
OEE figure to	99999.9 O <CR>	as a percentage	4F
Target to	999999 T <CR>	as units target	54
Production counts to	999999 A <CR>	as total - rejects	41
	<CR>	a final carriage return.	0D

The extra carriage return is added on the end to make a total of 69 characters.

Notice the letters in bold type, which are 'string terminators' you can use to identify each measurement. These can be used, for example, with our INT-S or S17XX or ERXS models in the "CR=XX" part of the menu. Put the Hex Value of the terminator in the XX position. For example, if you want to display only the OEE figure on a large remote display, use 'CR=4F'

Data is sent at 9600 baud, 8 data bits, 1 start bit, no parity, 1 or more stop bits.

If you view the data in hyperterminal, you will see something like this ...

```
9 9 9 9 9 . 9 R
9 9 9 9 9 . 9 Q
9 9 9 9 9 . 9 P
9 9 9 9 9 . 9 C
9 9 9 9 9 . 9 O
9 9 9 9 9 9 T
9 9 9 9 9 9 A
```

```
9 9 9 9 9 . 9 R
9 9 9 9 9 . 9 Q
9 9 9 9 9 . 9 P
9 9 9 9 9 . 9 C
9 9 9 9 9 . 9 O
9 9 9 9 9 9 T
9 9 9 9 9 9 A
```

```
9 9 9 9 9 . 9 R
9 9 9 9 9 . 9 Q
9 9 9 9 9 . 9 P
9 9 9 9 9 . 9 C
9 9 9 9 9 . 9 O
9 9 9 9 9 9 T
9 9 9 9 9 9 A
```

e t c . . .

Triggered string transmission.

The output data string rather than being transmitted dumbly once per second may be triggered by a suitable data string on the input line. At present, only the RS232 version has suitable hardware to do this.

The triggered mode is engaged by setting a meter address. This is set using the second front panel button.

Adr.--	for normal 'dumb' transmission
Adr.-1 to Adr.-E	for string transmissions triggered by <STX>n<ETX>
Adr.01 to Adr.EE	for string transmissions triggered by <STX>nn<ETX> where n is ASCII 1 to 9 or characters ;;<= or >
Adr.-0 or Adr.00	for string transmissions triggered by just <STX>ETX>

The code has been written to use the chip select line of the analogue output (which is not available on this product) to switch the RS485 transceiver from receive to transmit.

For half duplex RS485 (when hardware has been developed) the meter will switch from receive to transmit between 1 and 10mS after reception of the valid <ETX> character and release the RS485 lines within 20mS of the last character of the string being sent.

Valid trigger strings should only be received once per second.

Notes

Notes

Accessories

Shift and break timer modules

Production line sensors

Large slave displays to show:-

- Target
- Actual
- Takt
- Speed
- OEE
- Runtime

Serial output boards

Alarm relay boards

Sealed enclosures for dirty / wet environments
