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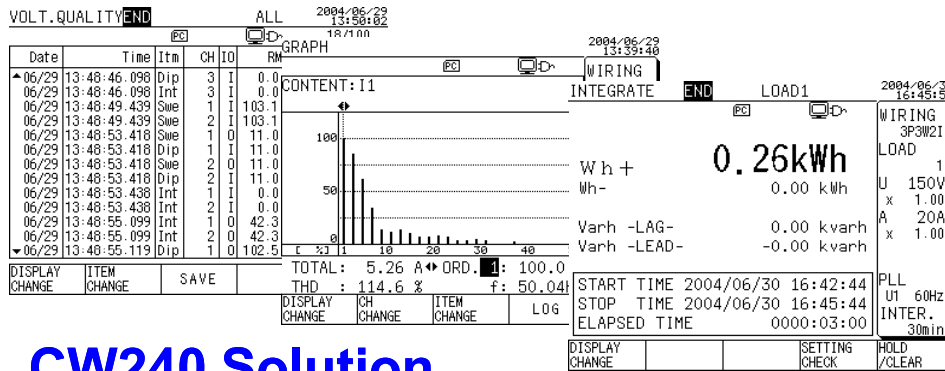


## CW240-D Clamp-on Power Meter Applications

**Yokogawa Electric Corporation**

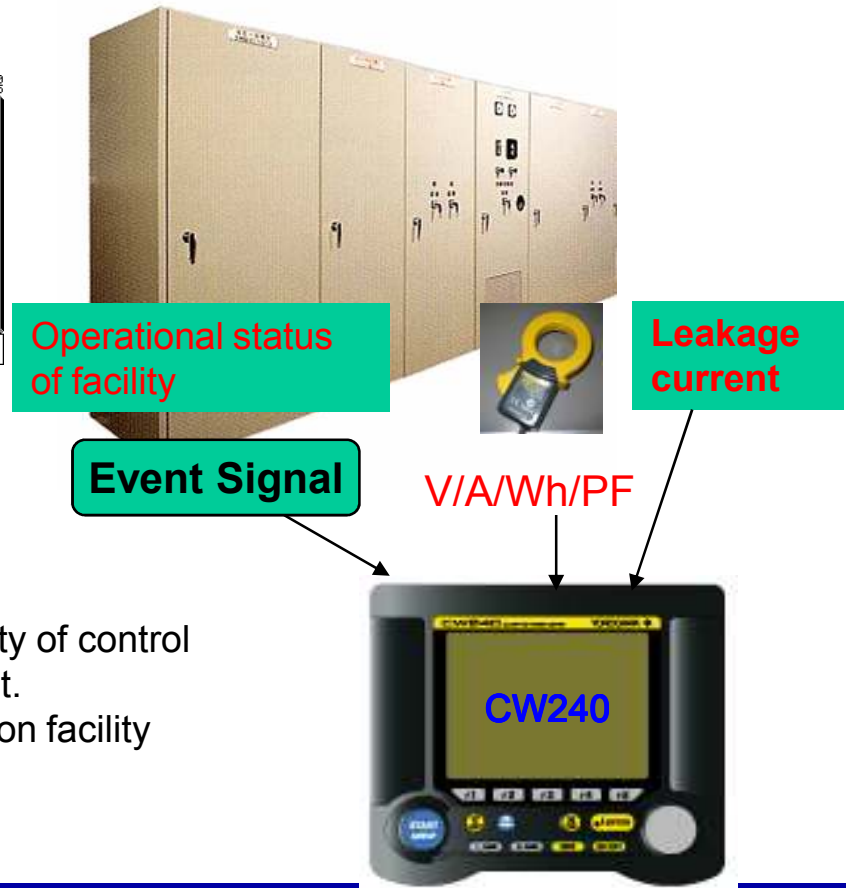


- Check the power supply quality of the factory production facility and operation of electric motors in the surrounding area
- Measure harmonics and leakage current on main power supply caused by peripheral devices such as PLC and Inverter to improve power supply quality. At the same time, check electric energy consumption.

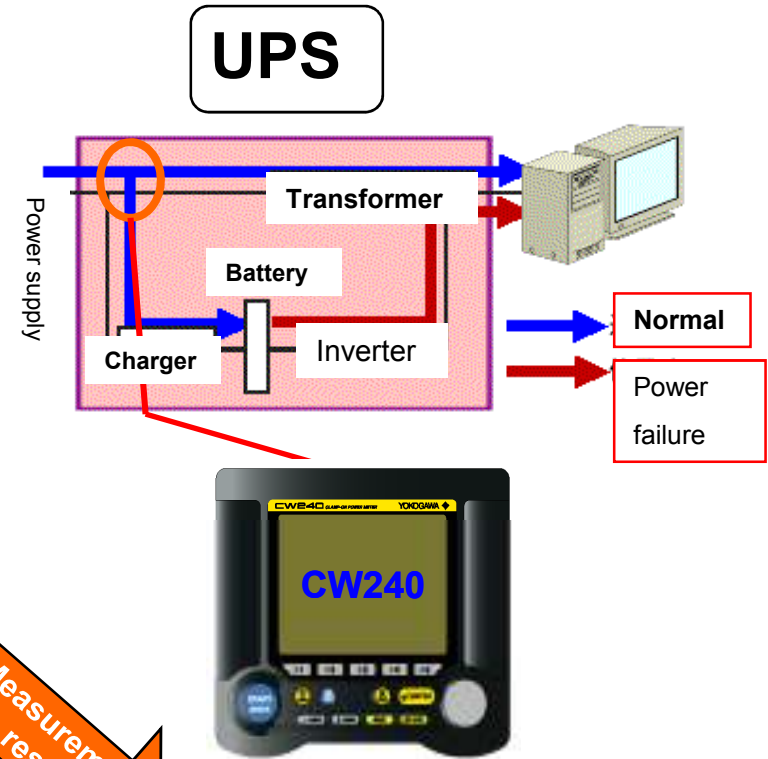
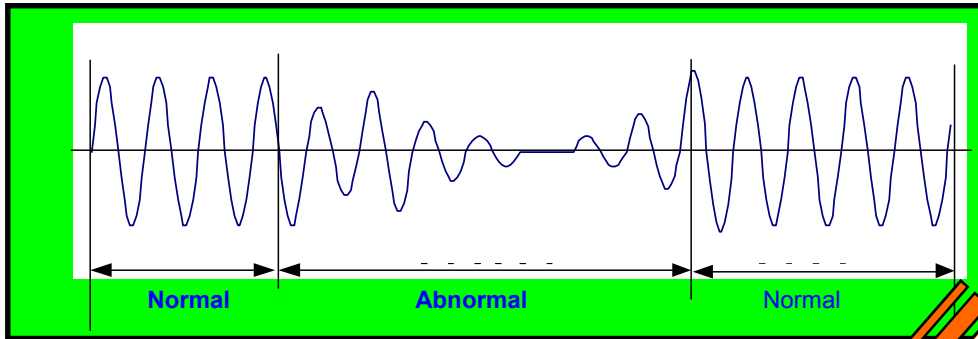


## CW240 Solution

- Simultaneous measurement of 2 analog signals and data related to electric power
- Detect abnormal condition of main power supply waveform in RMS value level. Save abnormal condition data over time
- Record mutual relationship for main power supply quality of control board and operational condition of peripheral equipment.
- Improve power quality by measurement of factory production facility power supply



Check the stable output condition of power supply by monitoring UPS output waveform when instantaneous power failure, voltage fluctuation and frequency fluctuation occurred on commercial power supply.



## CW240 Solution

- Level Trigger for electrical surges
  - Monitor Commercial power instantaneous interruption and voltage variation
- Direct measurement of I/O for 400V system UPS
- Data analysis of measured data by AP240E application software

Measurement result

Date	Time	Itm	CH	IO	RMS	Period
06/29	13:48:46.098	Dip	3	I	0.0 V	00:00:00.000
06/29	13:48:46.098	Int	3	I	0.0 V	00:00:00.000
06/29	13:48:49.439	Swe	1	I	103.1 V	00:00:00.000
06/29	13:48:49.439	Swe	2	I	103.1 V	00:00:00.000
06/29	13:48:53.418	Swe	1	O	11.0 V	00:00:03.979
06/29	13:48:53.418	Dip	1	I	11.0 V	00:00:00.000
06/29	13:48:53.418	Swe	2	O	11.0 V	00:00:03.979
06/29	13:48:53.418	Dip	2	I	11.0 V	00:00:00.000
06/29	13:48:53.438	Int	1	I	0.0 V	00:00:00.000
06/29	13:48:53.438	Int	2	I	0.0 V	00:00:00.000
06/29	13:48:55.099	Int	1	O	42.3 V	00:00:01.661
06/29	13:48:55.099	Int	2	O	42.3 V	00:00:01.661
06/29	13:48:55.119	Dip	1	O	102.5 V	00:00:01.701

QUALITY END ALL 2004/06/29 13:58:02 18/100

DISPLAY CHANGE ITEM CHANGE SAVE HOLD /CLEAR



## •Problem: Periodically the printing machine malfunctions

→ Assume the problem caused by Harmonics on power supply line

Odd order harmonics except 3<sup>rd</sup> order harmonics cause malfunction of electronics or power equipment. Especially, 5<sup>th</sup> order harmonics cause burnout of DC reactor for power factor improvement condenser.

Use CW240 harmonics measurement function to find harmonics on power supply line.

Harmonics were generated by internal load.

### Countermeasure:

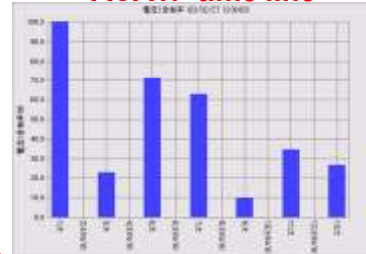
Set 5<sup>th</sup> and 7<sup>th</sup> transformer filter



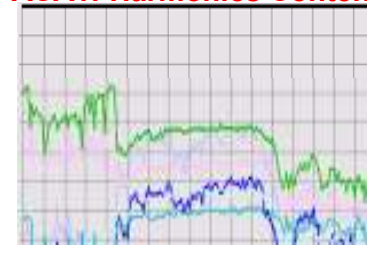
Measured by CW240

### Before

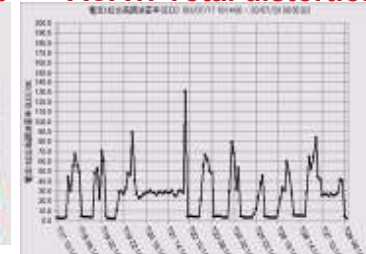
ACA1: time line



ACA1: Harmonics Content

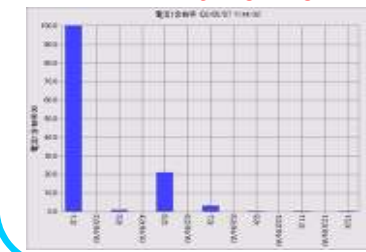


ACA1: Total distortion



### After

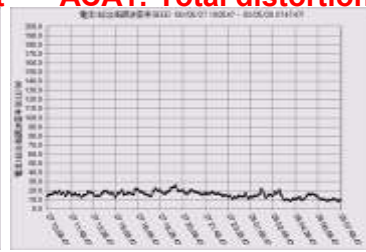
ACA1: time line



ACA1: Harmonics Content



ACA1: Total distortion



Result: Sharp decrease of relative harmonic content after 5<sup>th</sup> order. Distortion rate now <30% maximum



- Pump maintenance of water & sewerage system
- Measure voltage, current, flow, power factor, temperature and harmonics of pump motor

### • CW240 Solution

- Can measure voltage/current waveform down to 1 cycle of commercial power supply.
- Harmonics Noise measurement when pumps are running
- Monitor heat of pump motor by connection with analog output of thermometer or signal conditioner.
- Simultaneously measure consumption of electric energy and power factor, and use this data to determine changeout timing of bearings.



ACV/ACA/EP/PF

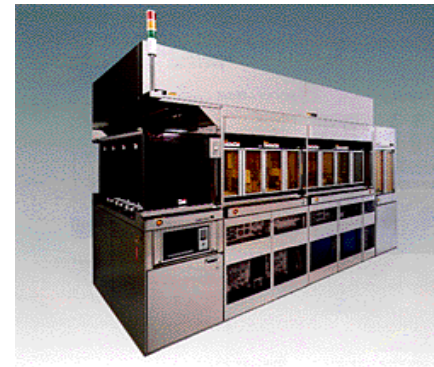


Measure Temp  
& Flow etc.





- **Power quality must be stable!**
- Measure stability of incoming voltage
- If a sag (**Within 2% of set value**) occurs, conduct random check of wafer ( **SEMI\_S2 Standard** )
- Occurrence time of sag and defective rate need to be reported
- **Actual condition and problems**
- There is no good field use type test equipment
- Need to investigate at power incoming unit and source of supply



Semiconductor manufacturing machine



distribution installation

## CW240 Solution

- Voltage fluctuation trigger function (from 1 cycle)
- Compact and easy to carry around
- Easy to generate report

Other users: Semiconductor equipment maker & High-precision processing plant



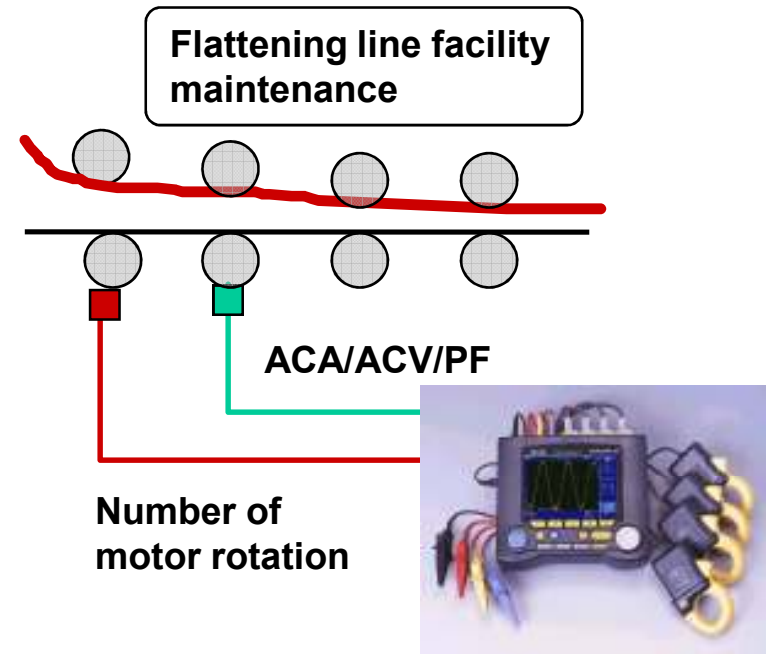
CW240



- **Facility maintenance of line**
- Voltage/current measurement of drive motor
- Monitoring rpm of motor
- 3 shaft vibration
- Prediction of motor life
- **Current condition & Problems**
- Using old thermal type recorder for monitoring
- To check abnormal condition, maintenance man needs to periodically patrol area.



**Manhour cost is very high!!!**

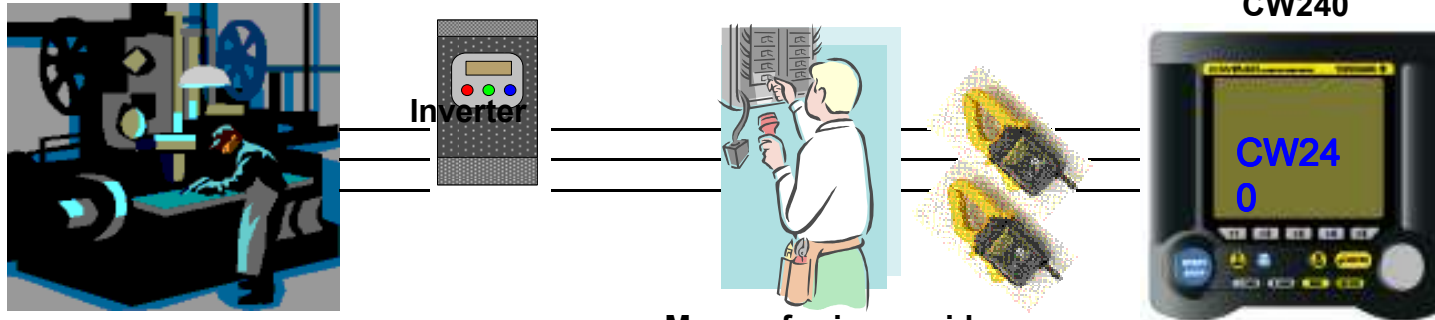


## CW240 Solution

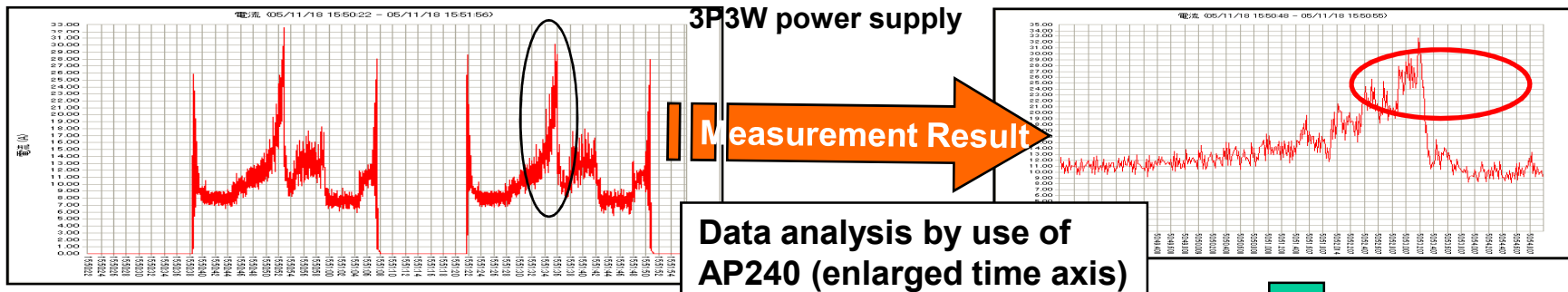
- Possible to save long-term data
- Compact and portable
- Simultaneous 2ch analog input measurements

**Other Users:  
Iron & Steel/nonferrous/Paper/Cable**

## Example: Determine when to change cutting tool for NC machine



Meas. of primary side  
3P3W power supply



### CW240 Solution

- Continuously measure motor's consumption current during the operation
- Compact/Battery driven/Easy to carry around
- Data analysis by AP240/Macro & Micro analysis

**Need to change tool when  
peak current is more than  
preset value!**