SM500F
Field-mountable videographic recorder
Electrical power monitoring on the SM500F

Introduction

Many of those responsible for process plants are unaware of the electrical power they consume.

In today's world where cost and carbon release issues are important, electrical power is an easy consumable to monitor, make visible and reduce consumption.

Electrical power monitoring can also be used as a maintenance tool to indicate faults in the process by the effect it has on the electrical consumption.

Of vital importance is obtaining a baseline by monitoring and recording initial plant consumption. Making this usage visible on the plant floor raises awareness of operators and management alike. By reviewing the records, improvements can be made to help reduce costs and carbon emissions.

ABB's ScreenMaster series of recorders are an ideal recording system for this requirement as they provide a cost-effective display and communications system to typical electrical power monitors.

When used with the totalizer function and 'Batch' a total electrical consumption can be calculated giving a precise cost-per-batch of product.

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Where is it used?

This application is relevant wherever electrical power is used:

– Water pumps

– Ovens and furnaces

– Conveyor belts

– Process heating

– Fans

ScreenMaster benefits

– Easy-to-read display, visible to operators and management

– Robust data-logging analysis

– Modbus TCP Master & Slave communications for easy integration with electrical meters over Ethernet

– Cost-effective

Which products are suitable?

– SM500F fitted with Ethernet, Maths

– SM1000 with Ethernet, Maths

– SM3000 with Maths
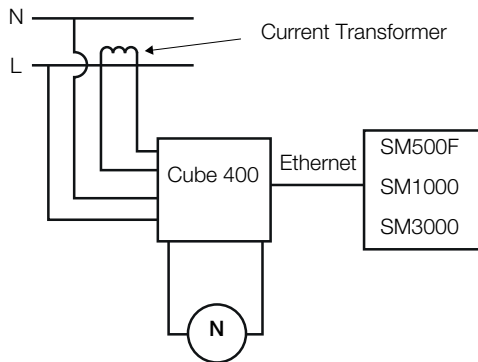
combined with an electrical meter.
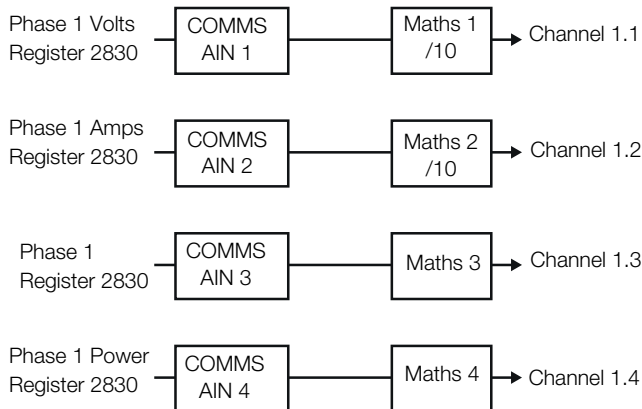

Fig. 1 Physical wiring diagram

Fig. 2 Logical wiring diagram

Application description

In this application the SM500F is used with no analog inputs fitted; ensuring the capital outlay remains low. Analog inputs, if fitted, can be used for process monitoring.

The recorder is used as a local operator display and recording system that can be viewed using a web server from any PC on plant. It provides both the baseline measurements and the monitoring of on-going improvements.

The electrical meter is an Ethernet-enabled device acting as a MODBUS TCP slave (server) device. The SM500F can function as a Modbus TCP Master (client) or slave (server) – in this application it acts as a Modbus TCP Master (client). The two are connected directly using a simple CAT5 crossover cable or via the local Ethernet infrastructure – both devices are fitted with RJ45 10BaseT connections. As neither device auto-negotiates the presence of a crossover cable, the cable status must be established first.

The SM500F is then configured as a Modbus TCP client (as above). This leaves individual parameters to be configured and read via the Ethernet link.

Each parameter required for use in the SM500F must then be configured as a 'Comms analog I/P', using the appropriate register on the electrical meter. There are many registers available and these would be documented fully in the electrical meter's Modbus manual.

Some of these values, when received by the SM500F, may require a multiplication factor to be applied to obtain the correct value. For example, if the electrical meter transmits a voltage reading of 231.4 V AC as a decimal integer value of 2314, this multiplication must be carried out using the Maths blocks available within the SM500F – in this case divide by 10.

To prevent the Maths functions from limiting the output and causing errors, the engineering range is set to a suitable range in the appropriate parameter text entry box when configuring the Maths function.

Notes

Contact us

ABB Limited
Process Automation
Howard Road
St. Neots
Cambridgeshire PE19 8EU
UK
Tel: +44 (0)1480 475321
Fax: +44 (0)1480 217948

ABB Inc.
Process Automation
125 E. County Line Road
Warminster
PA 18974
USA
Tel: +1 215 674 6000
Fax: +1 215 674 7183

www.abb.com

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