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Control of gas carburizing furnace CP

Better control of the enrichment gas flow rate stabilizes the carbon potential (CP), improving the quality of carburization.
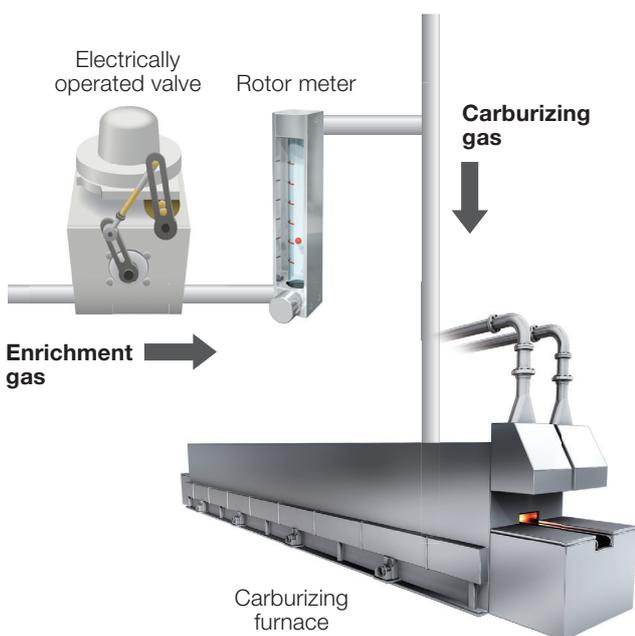
Gas flow rate control

Product — Process sensor Digital Mass Flow Controller	**Process/ equipment**
Model No. F4Q＿＿＿＿	

[Combustion & resistance furnaces]
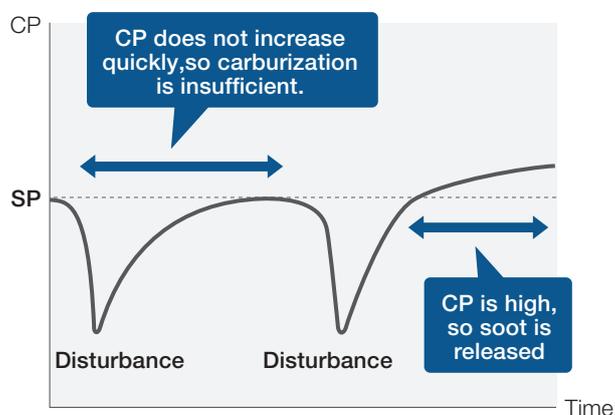Gas carburizing furnaces

Current Situation

- A motorized valve is used for enrichment gas flow rate control.
- A rotor meter monitors the enrichment gas flow rate.
- Enrichment gas is supplied at low pressure.

Current Problems

- Because the motorized valve has a large deadband and slow response, CP control is unstable.
- The rotor meter has no signal output, so remote monitoring and logging are not possible.
- Conventional mass flow controllers have a large pressure loss, so they cannot control low-pressure enrichment gas.

Electrically operated valve   Rotor meter

Carburizing gas

Enrichment gas

Carburizing furnace

CP

CP does not increase quickly, so carburization is insufficient.

SP

Disturbance   Disturbance

CP is high, so soot is released

Time

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Solutions

Solution 1
A mass flow controller with high-speed response quickly reacts to the control output from a carbon potential controller

Model F4Q has almost no deadband and fast response, so the CP stabilizes, helping to stabilize the quality of carburization.

Solution 2
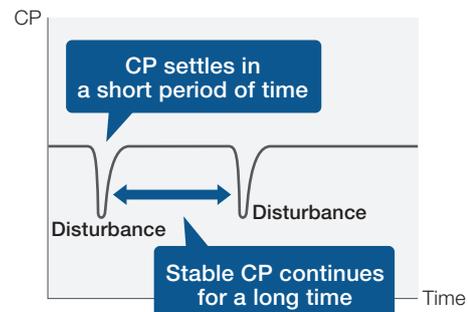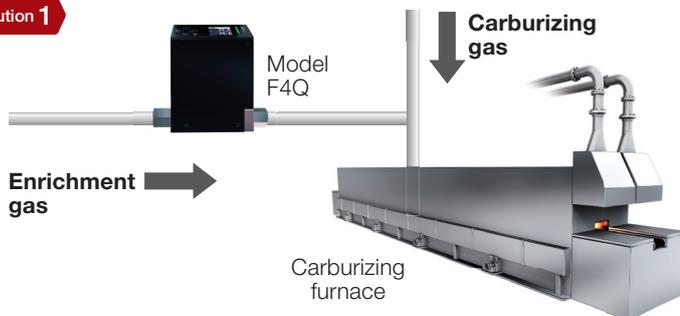## Analog output and digital communication

Model F4Q, which has analog output as a standard feature, can be used for remote monitoring and logging of flow rates. Using digital communication, the totalized flow rate, self-diagnostic information, and number of valve operations can be remotely managed.
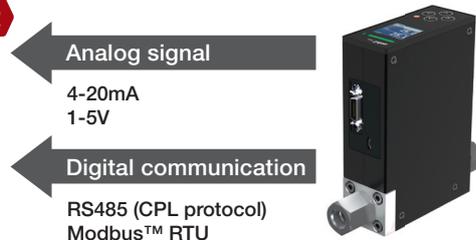
Solution 3
A controller with low pressure loss can control the enrichment gas

The flow path of the F4Q is straight, with no capillary and therefore no high pressure loss, so it can control even low-pressure gas.


Solution 1

Model F4Q

Carburizing gas

Enrichment gas

Carburizing furnace

CP

CP settles in a short period of time

Disturbance   Disturbance

Stable CP continues for a long time

Time

Solution 2

Analog signal

4-20mA
1-5V

Digital communication

RS485 (CPL protocol)
Modbus™ RTU

Modbus is a trademark and the property of Schneider Electric SE, its subsidiaries and affiliated companies.

Solution 3

Conventional mass flow controller structure

Structure of the model F4Q
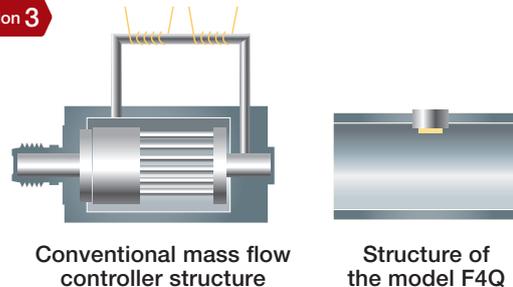
Related products

Digital indicating controller
Model C45/46

PID simulator supported.
The optimum PID values can be obtained with the PC loader, which can significantly reduce test run adjustment time.

Network Instrumentation Module
Smart Device Gateway* Model NX-SVG

Program-less communication can markedly reduce development time.

* A communication gateway that allows the interchange of information between various kinds of control device without programming, enabling smarter development work.

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