





SAMA Symbols Combustion Control Systems (CCS)

Introduction

The complexity of strategies used for combustion control requires a notation that exceeds the standard ISA (Instrumentation, Systems, and Automation Society) Process and Instrumentation Diagrams (P&IDs). The Scientific Apparatus Manufacturers Association (SAMA) developed such a notation and it is commonly used to define combustion control strategy.

Basics

The SAMA notation consists of four shapes, a series of letters for tag information and numerous mathematical control algorithms. These components, shown in the tables below, are combined to fully describe complex control logic.

Enclosure Symbols	
	Measuring or Readout
	Manual Signal Processing
	Automatic Signal Processing
	Final Controlling

Measurement/Readout Letters			
A	Analysis	R	Recording
C	Conductivity	I	Indicating
D	Density	Q	Integrating
F	Flow	U	Digital Acquisition
L	Level	T	Transmitter
M	Humidity	RT	Recording Transmitter
P	Pressure	IT	Indicating Transmitter
S	Speed		
T	Temperature		
V	Viscosity		
Z	Position		

Signal Processing Symbols			
Addition	Σ	High Selecting	$>$
Averaging	Σ/n	Low Selecting	$<$
Difference	Δ or $-$	High Limiting	∇
Proportional	K or P	Low Limiting	\nless
Integral	\int or I	Reverse Proportional	$-K$ or $-P$
Derivative	d/dt or D	Velocity Limit	$V \nless$
Multiplying	\times	Bias	\pm
Dividing	\div	Time function	$f(t)$
Root Extract	$\sqrt[n]{x}$	Signal transfer	T
Non-Linear	$f_1(x)$	Signal generation	A
Tri-state	\updownarrow	Signal comparator	H/, /L

Typical Control Loop

The following shows a typical control loop in both ISA and SAMA formats to give a comparison of the methods:

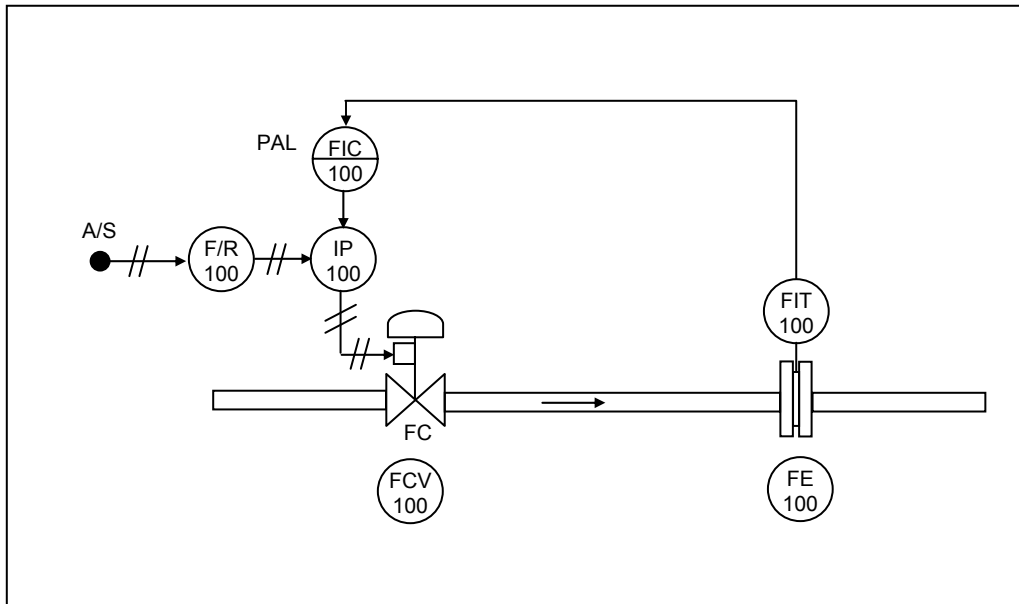


FIG. 1 TYPICAL ISA CONTROL LOOP

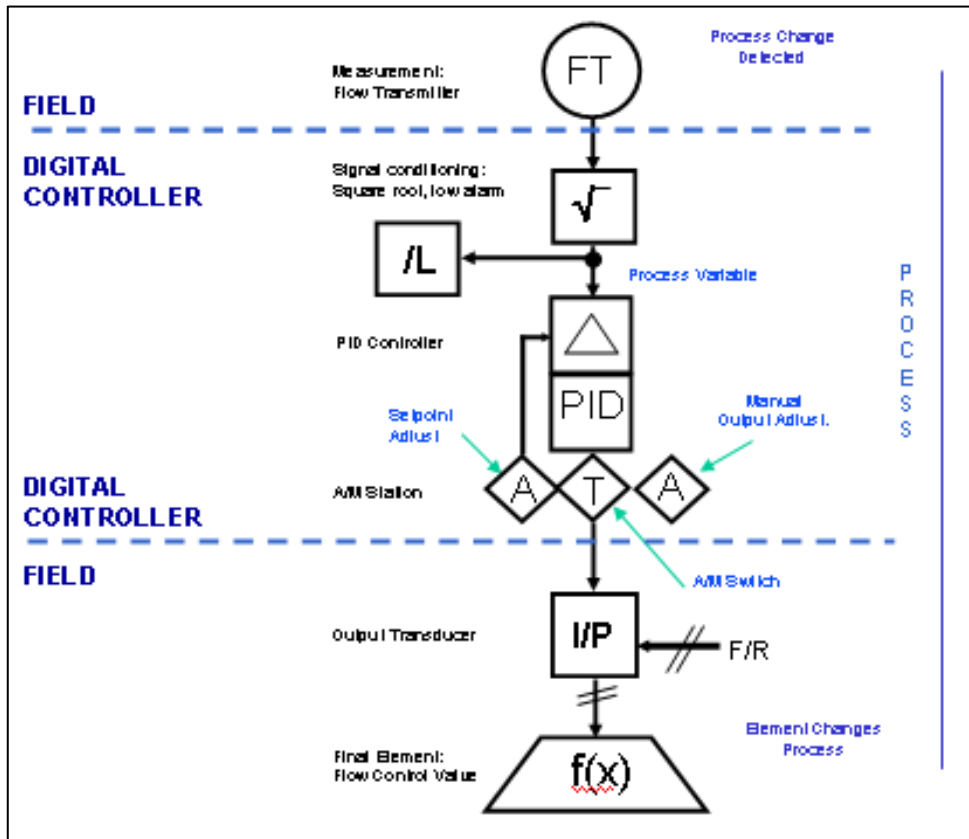


FIG. 2 TYPICAL SAMA CONTROL LOOP

Refer to the Application Data Sheets for Combustion Control for detailed SAMA logic diagrams for each control strategy.

