# COMMANDER SR100A & SR100B

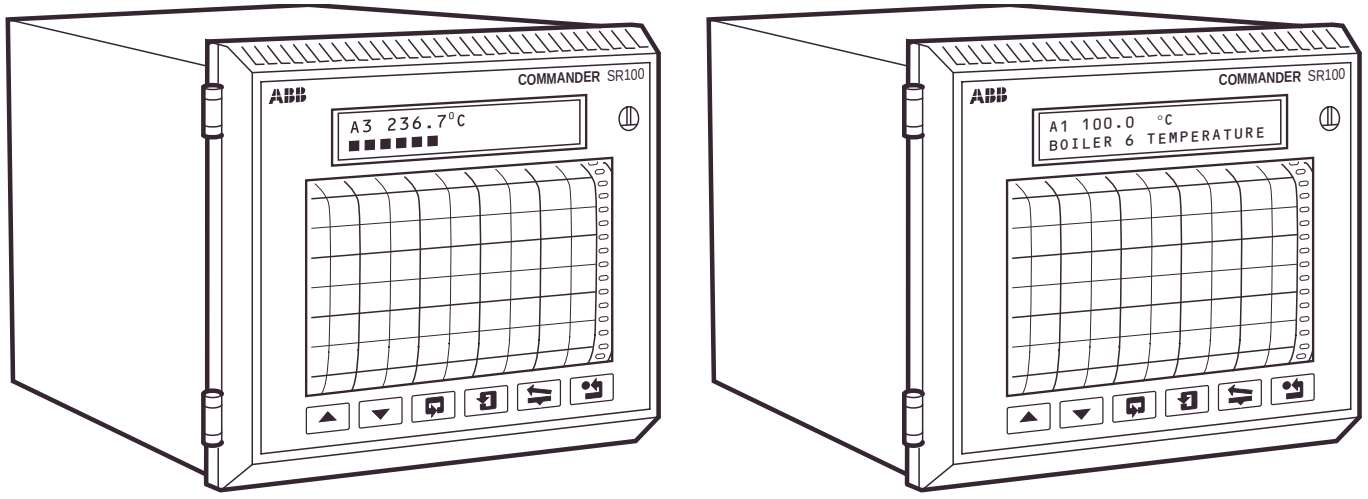



ABB Instrumentation

# COMMANDER SR100A & SR100B

## Technical Innovation

- Advanced print head design
  - Bi-directional printing
  - Rest position off page
  - Continuous trace or separate dots
- Robust door and catch system
  - IP65 / NEMA 3
  - Compact case design; 230mm (9in.) behind panel
- Universal inputs
- PC Configuration standard on all versions
- Basic and advanced versions
- Automatic Chart Rewind

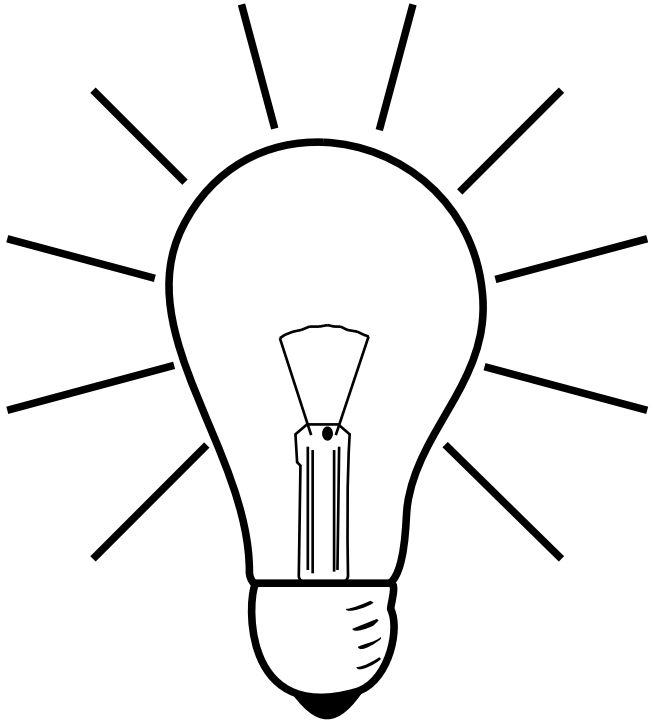


ABB Instrumentation

# COMMANDER SR100

## Product Positioning

### SR100B

- Basic applications
- 3- or 6-channel versions
- Trace on paper
- Limited printing and scale formats
- Temperature/process recording market

### SR100A

- Advanced applications
- 1 to 6 channels available
- Detailed chart print out
- Data gathering
- Data storage on PC card
- Recording with sequence and math requirement

# COMMANDER SR100

## Choice of Process Connections

| | SR100B | SR100A |
|---|---|---|
| Analog Inputs | 3 or 6 | 1 to 6 |
| Transmitter PSU | 3 loops – standard | 3 loops – standard |
| Analog Outputs | – | 12 optional |
| Relays | 6 optional | 12 optional |
| Digital Inputs | 1 standard | 1standard,<br>12 optional |
| Digital Outputs | – | 12 optional |

# COMMANDER SR100

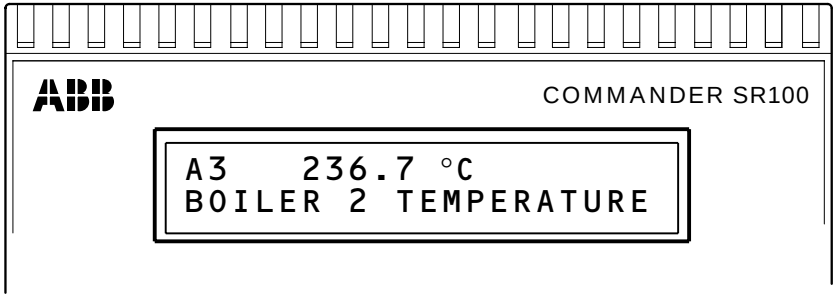
# Operations

ABB Instrumentation

# COMMANDER SR100 – Operations

## Universal 100mm Recorders

- High-clarity LCD display
  - Two-line alpha-numeric and bargraph
  - 2 x 20 character, long life, back-lit LCD
  - Different display formats
- Eight display frames available
  - Display in sequence
  - Automatically or Manually

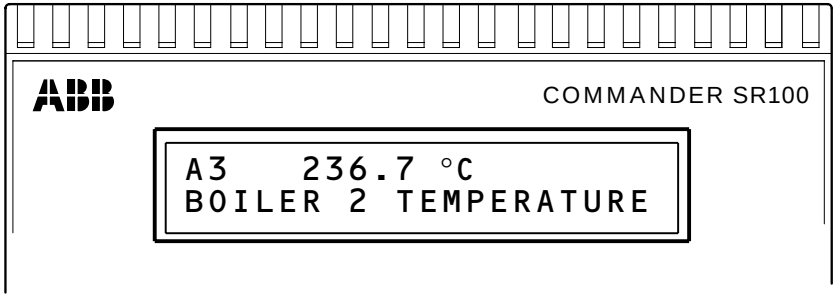


# COMMANDER SR100 – Operations

## Universal 100mm Recorders

### SR100 A

- Frame types
  - Pen value (Multi-display)
  - Digital values, including alarms
  - Totalizer + PV
  - Measured variable, channel no.
- Selectable lower frame line
  - Bargraph
  - Channel tag




### SR100 B

- Frame types – Fixed format
  - Measured variable, channel no.
- Selectable lower frame line
  - Channel tag

ABB Instrumentation

# COMMANDER SR100

## Simple Operations

**Raise parameter value**

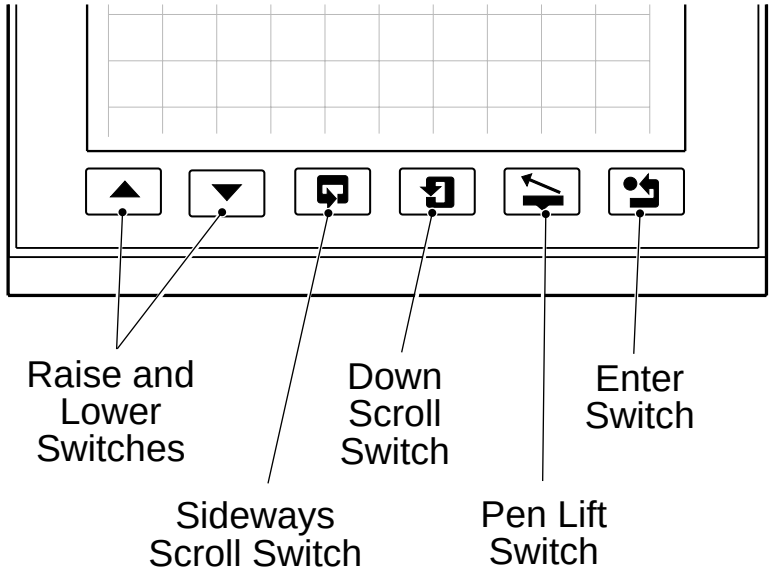
**Lower parameter value**

**Advance to next page or return to page header**

**Advance to next parameter**

**Lift/lower pen on alternate operation**

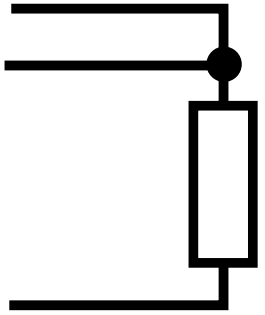
**Store new value**



# COMMANDER SR100

## Flexible and Accurate

- Up to 12 universal inputs
  - Type B, E, J, K, N, R, S, & T Thermocouples, Pt100, mA, mV and V
- Programmable fault levels and actions
  - Type B, E, J, K, N, R, S, & T Thermocouples, Pt100, mA, mV and V
- 2-wire transmitter power supply
  - 70mA at 24V (3 loops)
- Accuracy ±0.1%
  - Clear and accurate recording
- Power supply
  - 85 to 265V ac
  - 10 to 30V dc
  - 24V ac



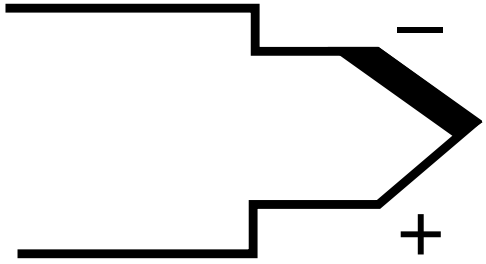
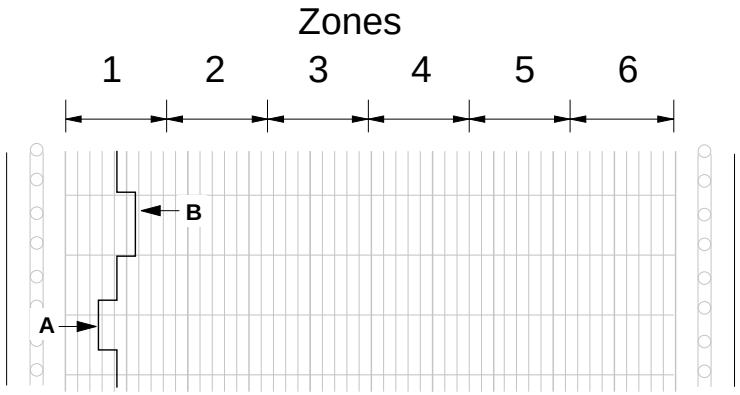



ABB Instrumentation

# COMMANDER SR100

## Chart Trace

- One digital input as standard
  - Change chart speed, stop chart or alarm acknowledge
- Digital filter reduces the effect of noise
- Two configurable pen functions
  - Chart trace trend of analog inputs or math results
  - 3-position event marker (In, Off or Out)
- 6 programmable zones for event marking – SR100A only



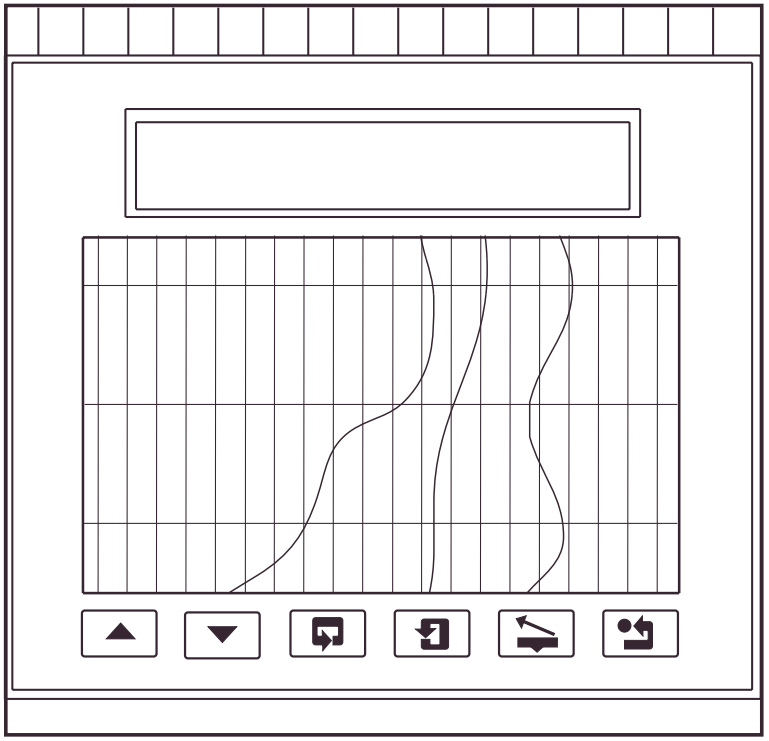

Zones 1 to 6 each 16.6mm wide.

Events A and B represented by a 3mm shift from the centre line.

# COMMANDER SR100

## Chart

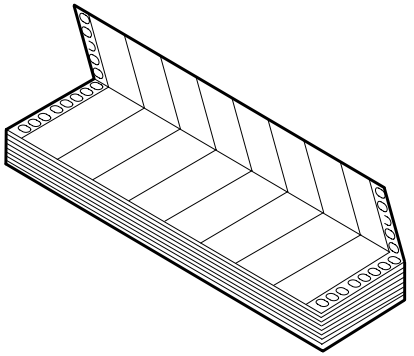
- Printed dots overlap giving a continuous, unbroken trace at chart speeds up to 500 mm/hr
- Message printing overlaps continuous traces at chart speeds of up to 120mm/hr
- At chart speeds of 120mm/hr and above, the trace is broken for text
- If new dot is more than a dot's width from the last postion, the pen is dropped and dragged to produce a trace



# COMMANDER SR100

## Easy to Use

- Roll or fanfold chart
  - Flexibility of customer choice
  - 25m (82ft) Roll Chart,
    12m (39ft) Fanfold Chart
- Automatic chart rewind
  - Simplifies chart changing
- Quick-fit pen cartridge
  - Changed in seconds
- Removable chart cassette
  - For easy chart replacement
- Instrument ranges the chart
  - Standard chart used, recorder adds ranges and scales to suit the application



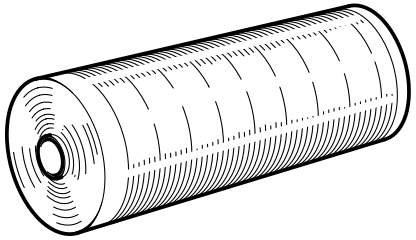


ABB Instrumentation

# COMMANDER SR100

## Tough and Rugged

- Stainless steel case
  - Hard wearing, corrosion resistant
- Chemically-resistant polycarbonate door
- High security
  - Optional door lock
- IP65 / NEMA 3 front facia
  - Ideal for harsh environments, outdoors or indoors

# COMMANDER SR100

# Features

ABB Instrumentation

# COMMANDER SR100B

## Power without Complexity

- 3- or 6-point recorder
  - for basic ‘pen-on-paper’ applications
- Chart annotation as standard
  - makes chart record clear
  - time, date, chart speed, channel scales and alarm indication
- Can be supplied preconfigured and ‘ready to run’

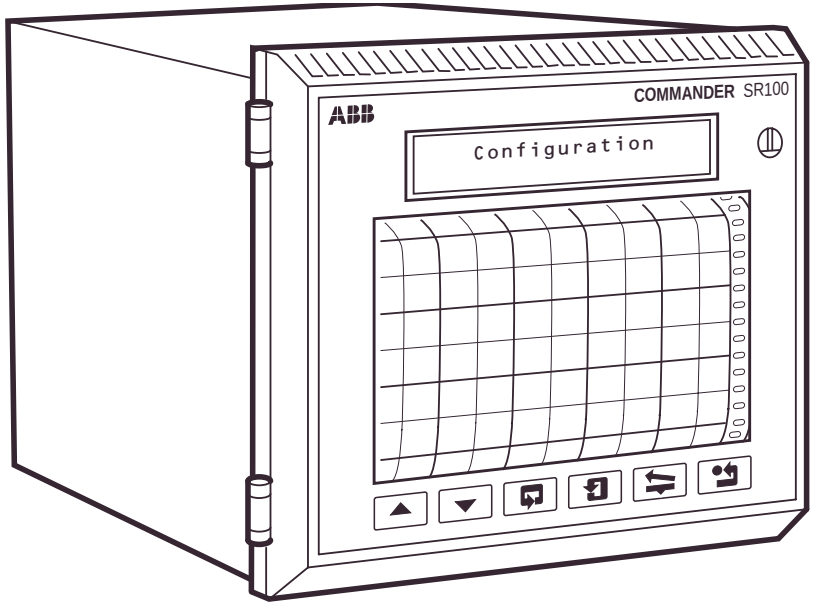
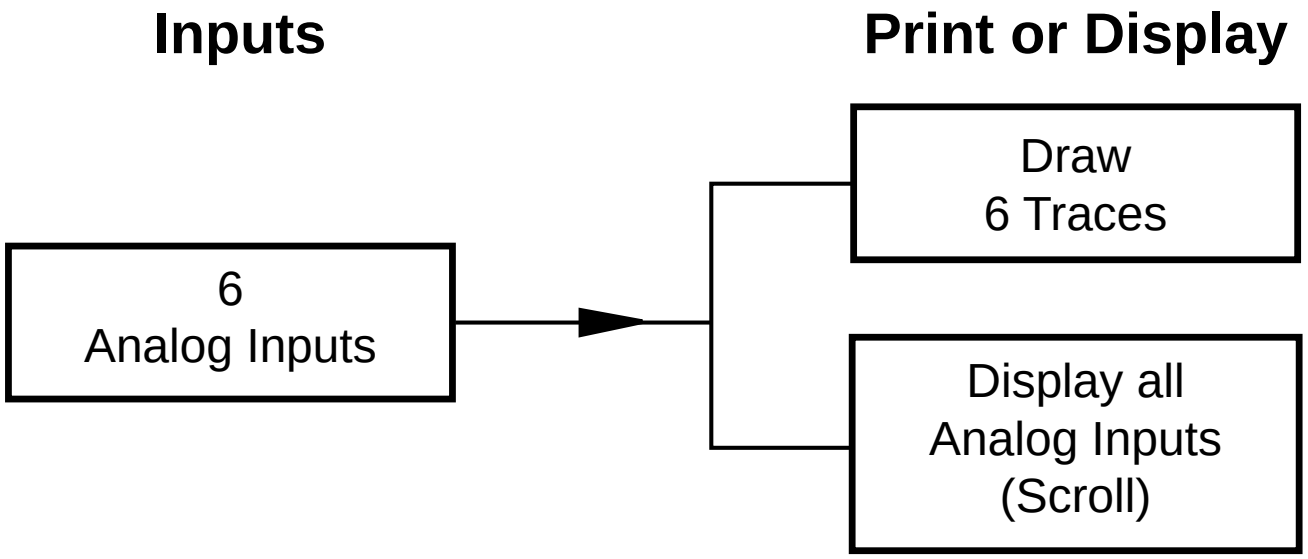



ABB Instrumentation

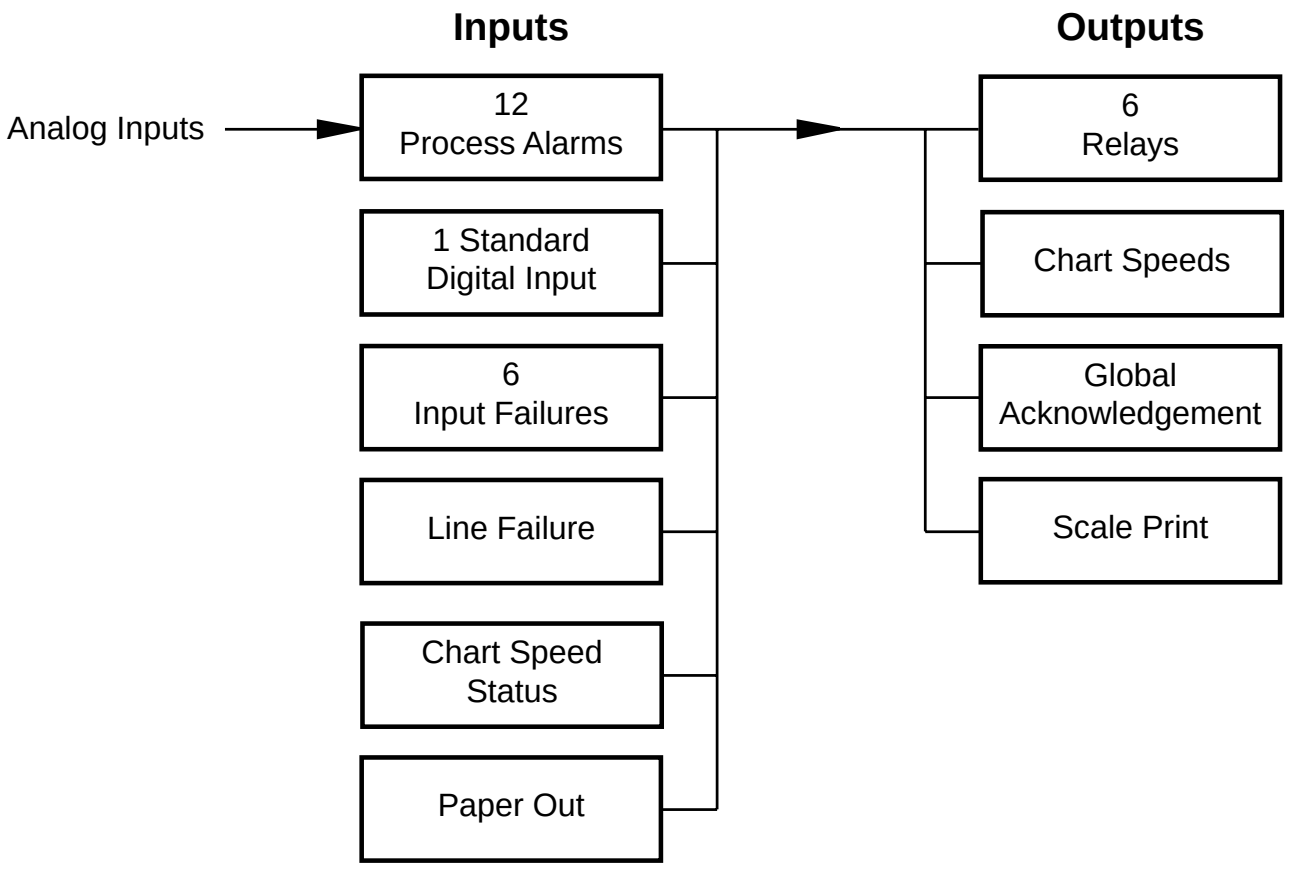
# COMMANDER SR100B

## Analog Block Diagram



# COMMANDER SR100B

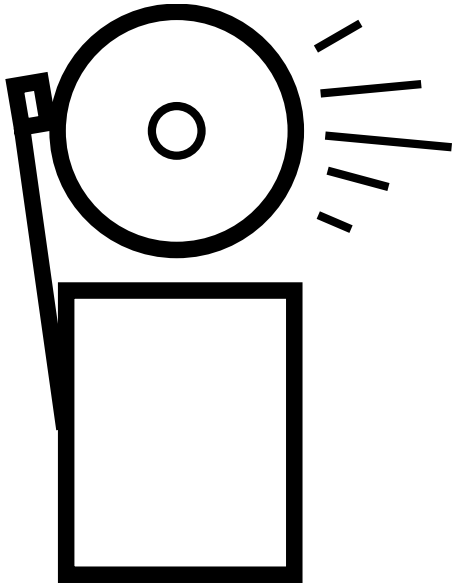
## Digital Block Diagram



# COMMANDER SR100B

## Keep control of your process

- 12 Alarms available
  - High/Low process alarms with hysteresis
  - Can be allocated to relays or print alarm on chart
- Up to 6 relays can be fitted
  - Rated 5A 230V



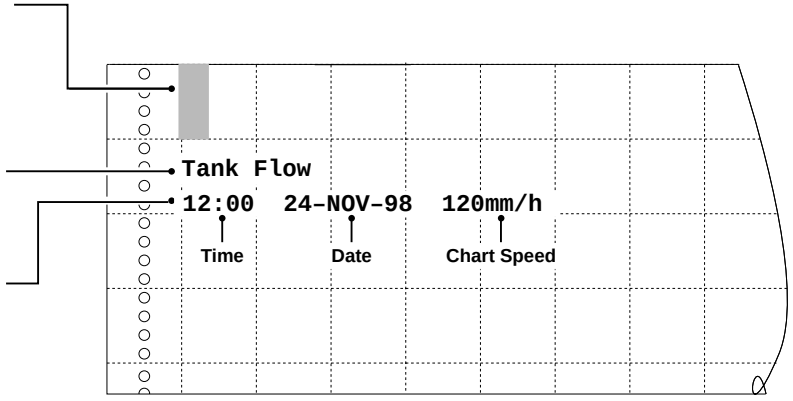
# COMMANDER SR100B

## Chart Text…

**End of Chart Warning** –
last 2m (roll chart) or 1.5m (fanfold)

**Channel Tag** – every 240 mm

**Time, Date & Chart Speed** –
power-up and every 240 mm

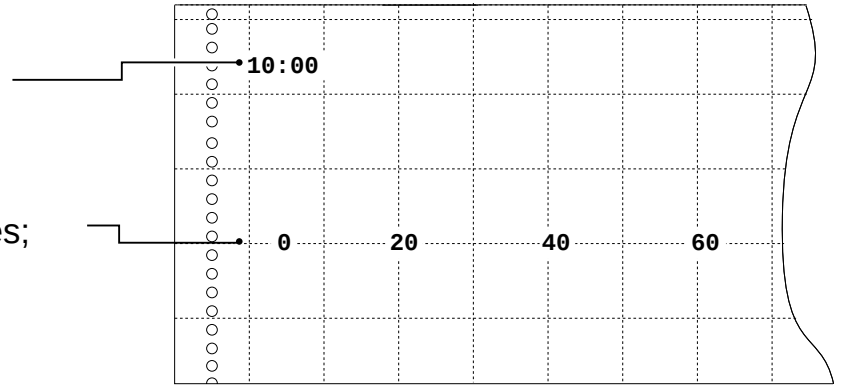


# COMMANDER SR100B

## Chart Text…

**Time** – nearest hour or
half hour after 60mm of trace

**Chart Scale** – 6 different scales;
printed every 10mm to 240mm
(programmable)



# COMMANDER SR100B

## Chart Text…

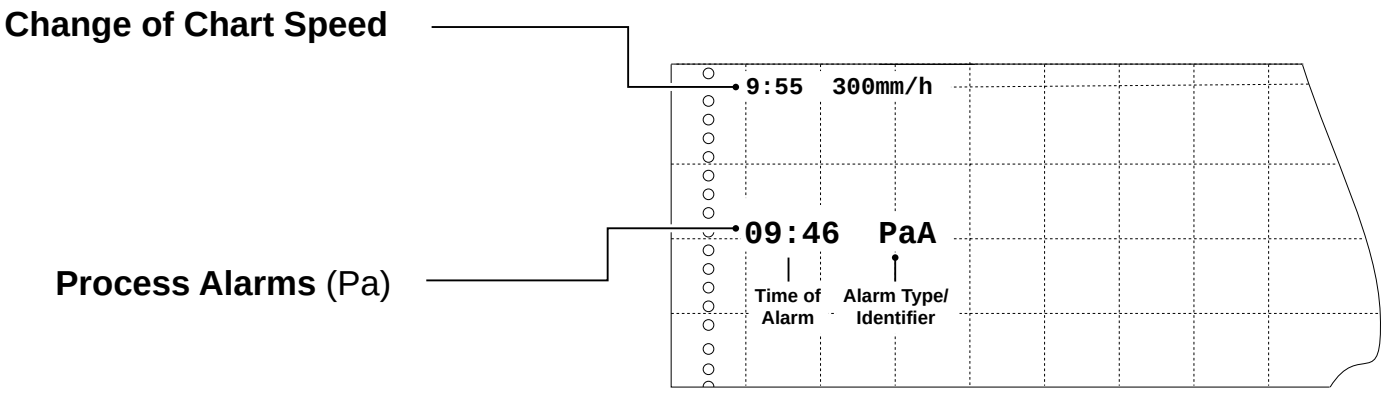
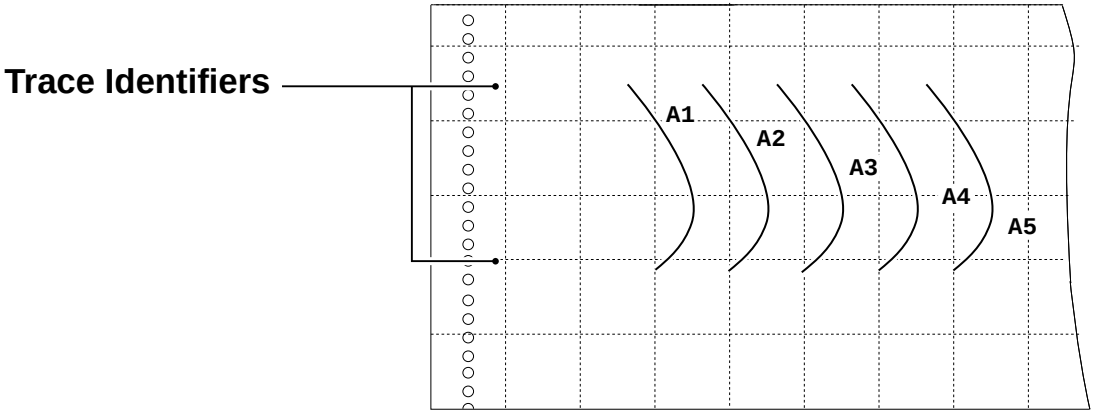



ABB Instrumentation

# COMMANDER SR100B

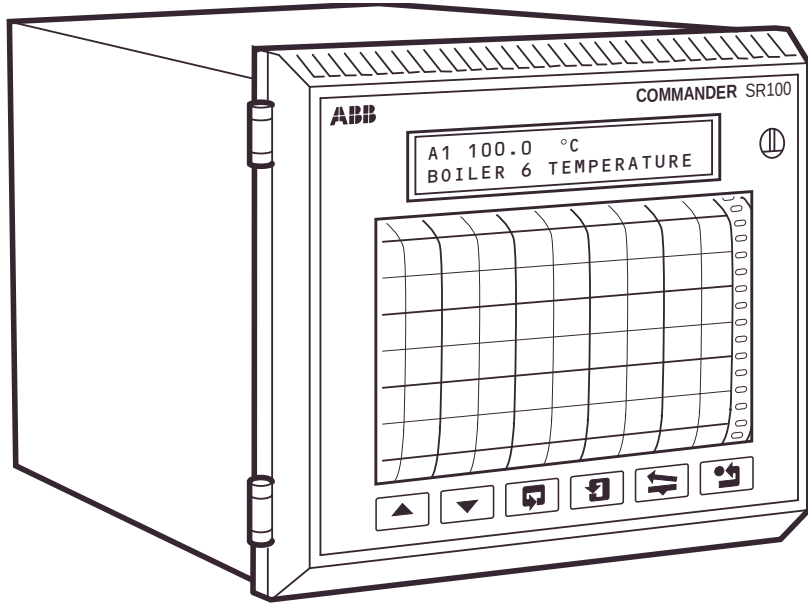
## Chart Text…



# COMMANDER SR100A

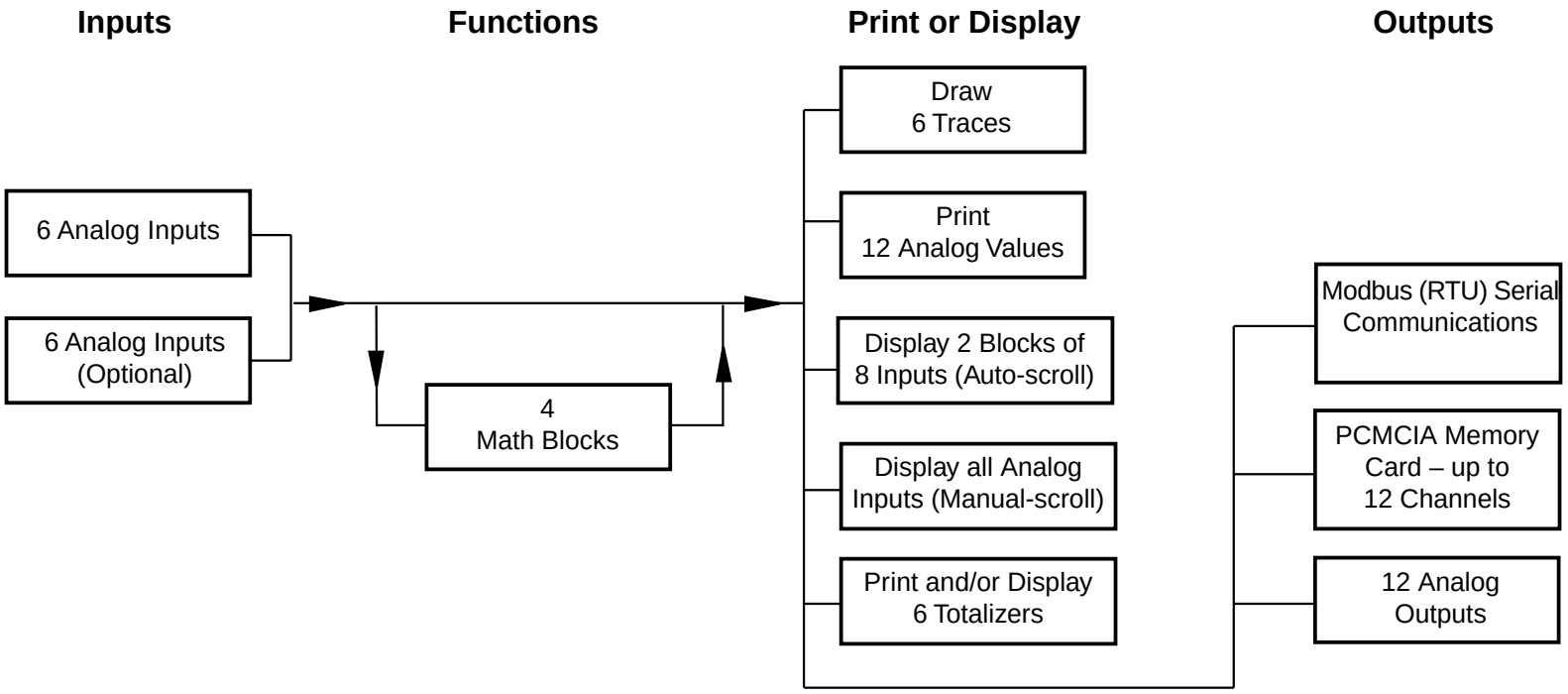
## Simplicity with Power

- 1- to 6-point recorder
  - Advanced strip chart recorder
- 5 Display configurations
  - PV + Units + Bargraph; PV + Units + Channel Tag; PV + Units + Totalizer; Digital Signals; Multiple PV's + Units
- Unique 'Cue & Review'
  - Historical analysis of data while the chart is still in the recorder
  - Buffering of last ten alarms
- Full chart annotation
  - Alarm messages, batch number, totalizer print, value print, time, date, chart speed



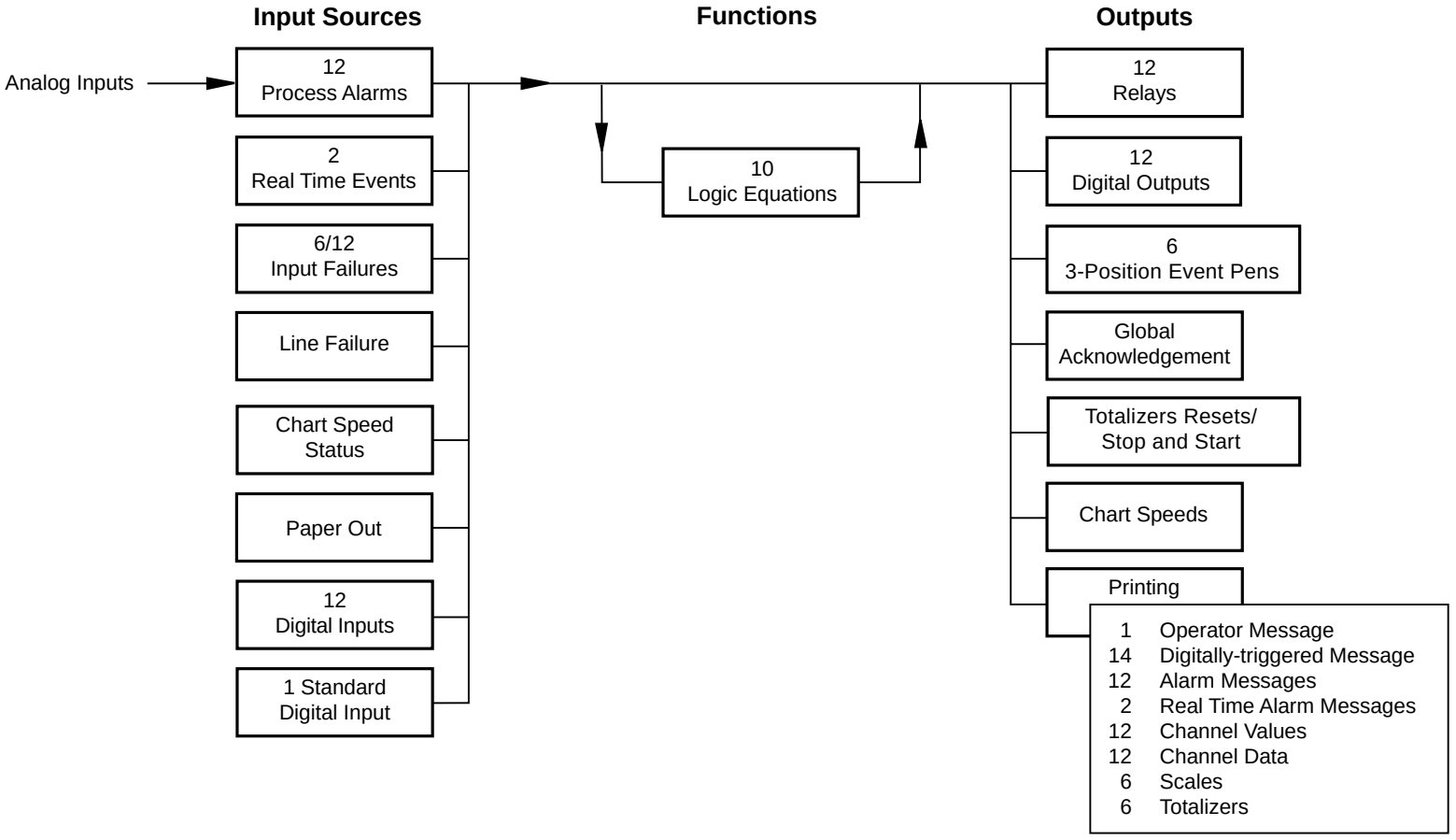
# COMMANDER SR100A

## Analog Block Diagram



# COMMANDER SR100A

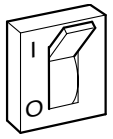
## Digital Block Diagram



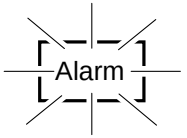
# COMMANDER SR100A

## Interface with your process

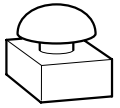
- Configuration flexibility with internal soft-wiring
  - allocation of alarms internally without hard wiring




- 12 Alarms as standard
  - soft-wired to relays or logic equations
- Up to 12 relays for sequential process requirements
  - Rated 5A



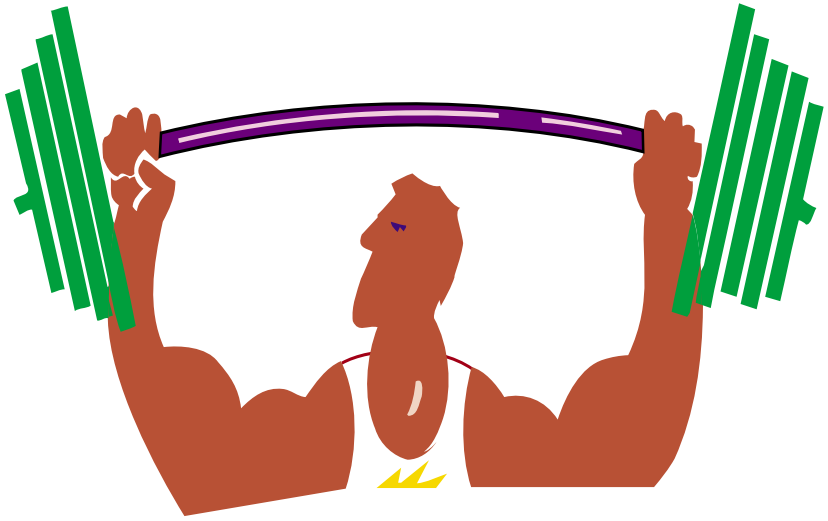

- Up to 13 digital inputs
  - Soft-wired to logic equations, message print or chart control
  - 5V TTL or Volt-free



# COMMANDER SR100A

## Processing power

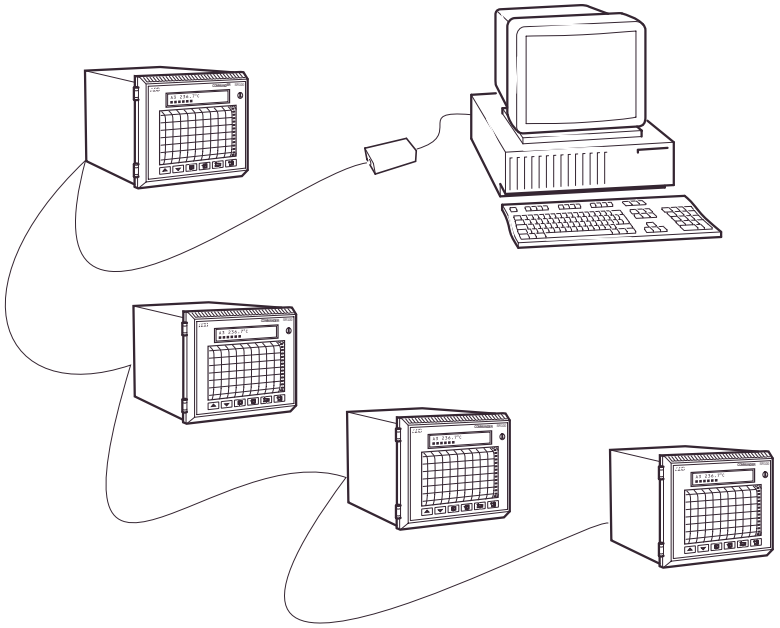
- 4 math blocks
  - Add, Subtract, Multiply, Divide, RH, Mass Flow, Low High and Median Select
- 6 Flow totalizers
- 10 logic equations
  - Input from alarms or digital inputs
  - AND and OR
- 2 real-time event timers
- 1 x 20-breakpoint linearizer
  - Ideal for non-linear tanks or special thermocouples



# COMMANDER SR100A

## Flexibility of Interfaces

- RS485 Modbus RTU
  - Available as an option for communication with control systems
  - 2- or 4-wire connections
- 12 analog retransmission outputs
  - Can be allocated to input signals or result of math blocks



# COMMANDER SR100A

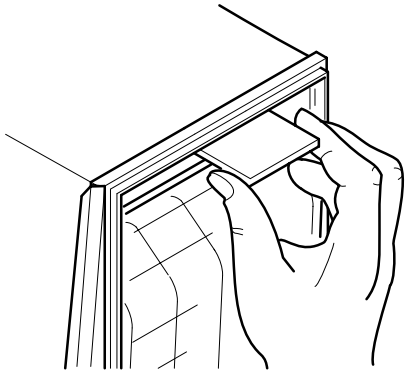
## Memory Card...

- DOS-formatted for direct viewing on spreadsheet
- Recording of up to 12 channels
- Recording of process alarm states
- Date and time stamped
- Channel tags and units for each channel

# COMMANDER SR100A

## Memory Card

- PCMCIA memory card
  - Configuration storage
  - Data logging for simple interfacing with your PC
  - ‘Open System’ – transfer to MS Excel & Lotus 123 spreadsheets
  - Data logging – 640kb, 1Mb, 2Mb & 4Mb card capacities
  - Memory card logging capacity dependent on memory card size and scan time
- Scan rates from 1 to 240 seconds



| Card Size | Usable Bytes |
|---|---|
| 64k | 63,488 |
| 128k | 129,024 |
| 256k | 260,096 |
| 512k | 521,216 |
| 1M | 1,045,504 |
| 2M | 2,092,032 |
| 4M | 4,186,112 |

Card Running Time (hrs) =

$$\frac{\text{scan interval (secs) x useable bytes}}{\text{(13 + [No. of channels x 7]) x 3600}} \text{ hrs}$$

Where:

Scan interval = 1 to 240 seconds

Usable bytes = number of bytes usable for data logging – see Table

No. of channels = 1 to 12

ABB Instrumentation

# COMMANDER SR100A

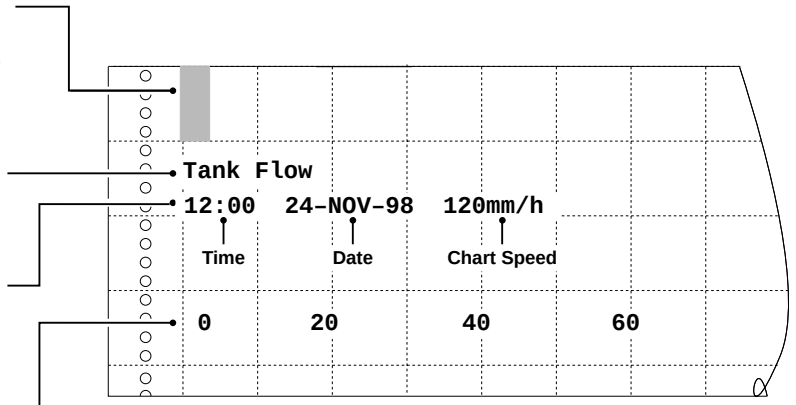
## Chart Text...

**End of Chart Warning** –
last 2m (roll chart) or 1.5m (fanfold)

**Channel Tag** – every 240mm

**Time, Date & Chart Speed** –
power-up and every 240mm

**Chart Scale** – 6 different scales;
printed every 10mm to 240mm
(programmable)



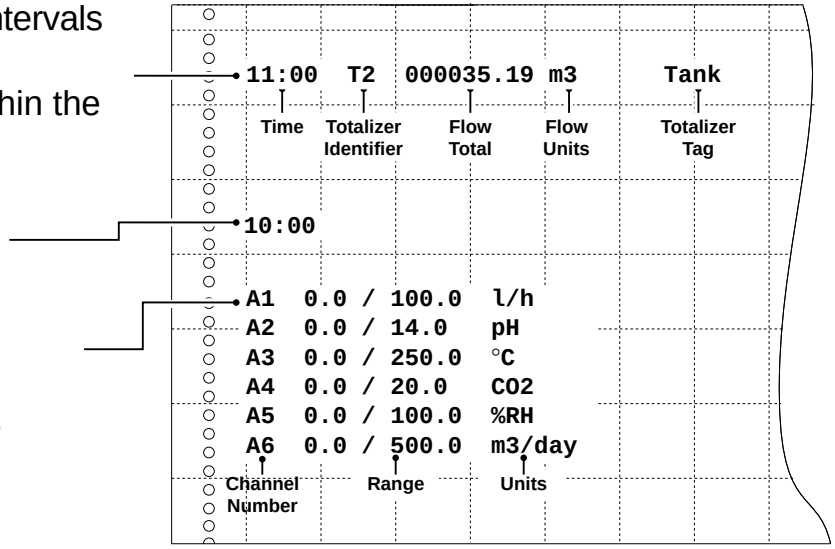
# COMMANDER SR100A

## Chart Text...

**Totalizer Values** – Printed at intervals between 5 and 720min;
from a digital signal or from within the Print Messages Page

**Time** – nearest hour or
half hour every 60mm of trace

**Channel Data** – engineering range and units, printed on demand from a digital signal or from within the Print Messages Page



# COMMANDER SR100A

## Chart Text...

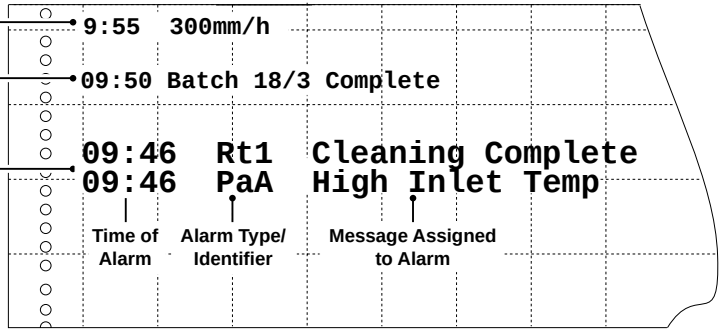
**Change of Chart Speed**

**Operator Message** – printed from a digital signal or from within the Print Messages Page

**Process Alarms** (Pa)

or

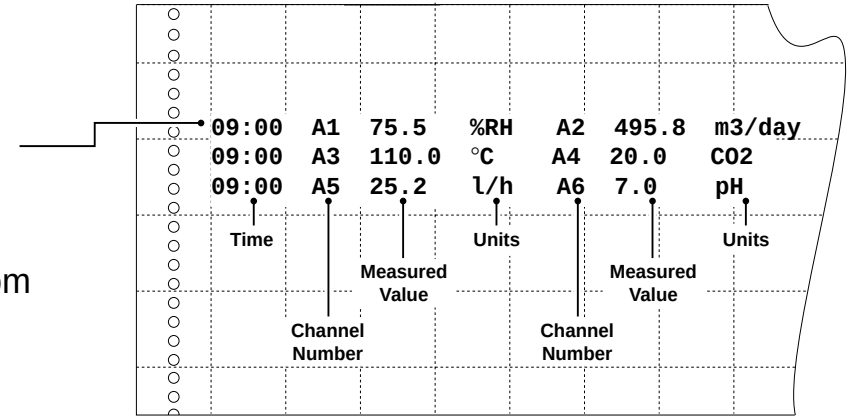
**Real Time Alarms** (Rt) – printed in red if an alarm condition occurs. Any message assigned to the alarm is also printed



# COMMANDER SR100A

## Chart Text...

**Channel Values** – Printed at programmable time intervals (between 5 and 720 minutes), on demand from a digital signal or from within the Print Messages Page



# COMMANDER SR100A

## Chart Text

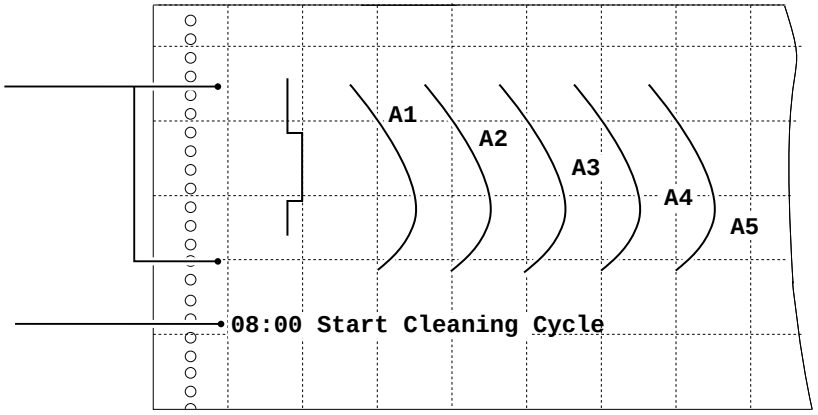
**Trace Identifiers**

Event Marker – Identified with either:

'<' – input A active, pen in

'>' – input B active, pen out

**20 Character Message Block** – up to 14 different messages can be printed on demand from a digital signal



# COMMANDER SR100

## PC Configuration with MS Windows

- Create configurations in minutes
- Save onto disk or memory card
- Print out hard copy
- Download to recorder
- All recorders have dedicated configuration ports
- Compatible with MS Windows 3.1, 95, 98 & NT

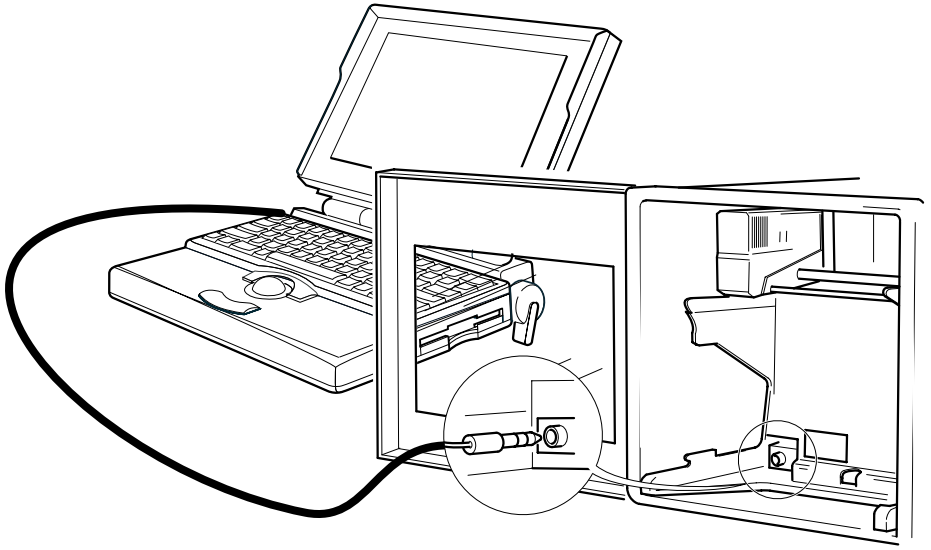


ABB Instrumentation

## COMMANDER SR100

# Application Features

ABB Instrumentation

# COMMANDER SR100

## Easy View

- Instant view of the latest trace and process conditions

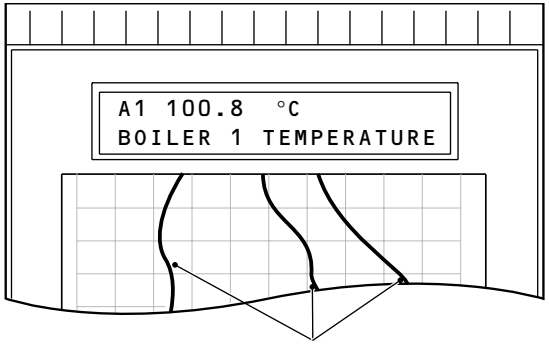
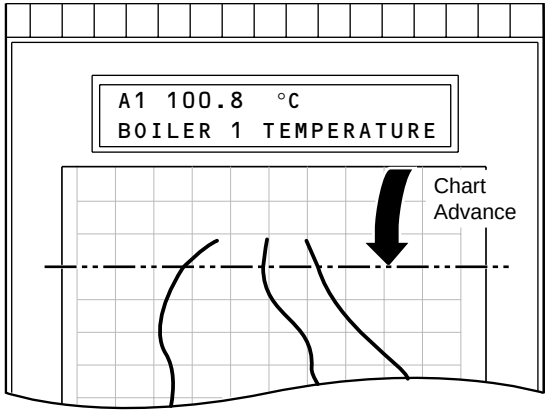



Chart traces during normal operation
(in Operating Page 1 or 2)




1. Operate the ▼ switch to activate Easy View

2. The chart advances approximately 30mm for 5 seconds and then rewinds to its original position and resumes recording

# COMMANDER SR100A

## Cue & View

- Post-incident and historic data review
- Last 10 process or real-time alarms buffered and available for review
- Advance/rewind facility
  - Review long term and monitored data

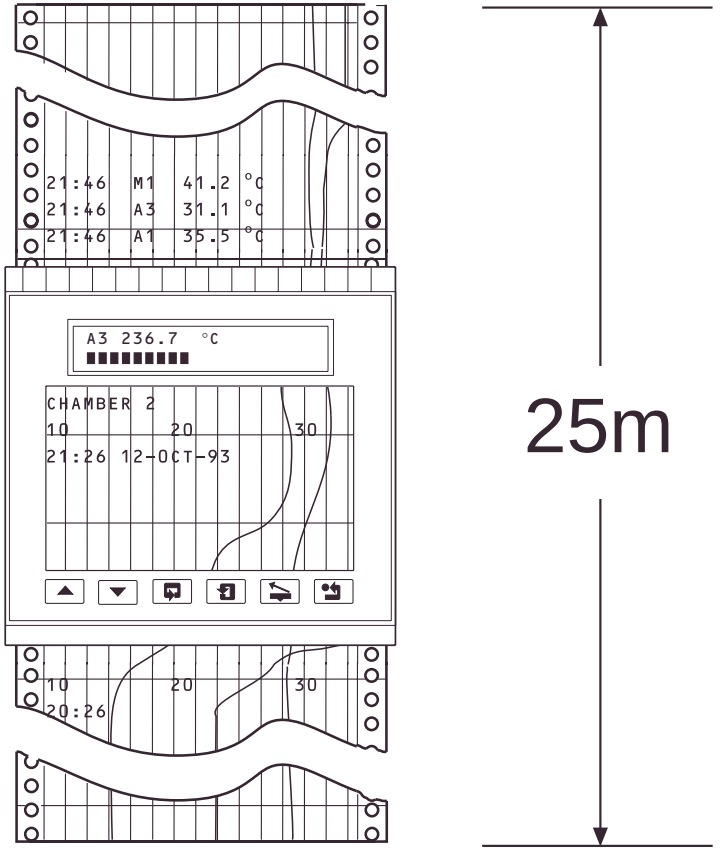
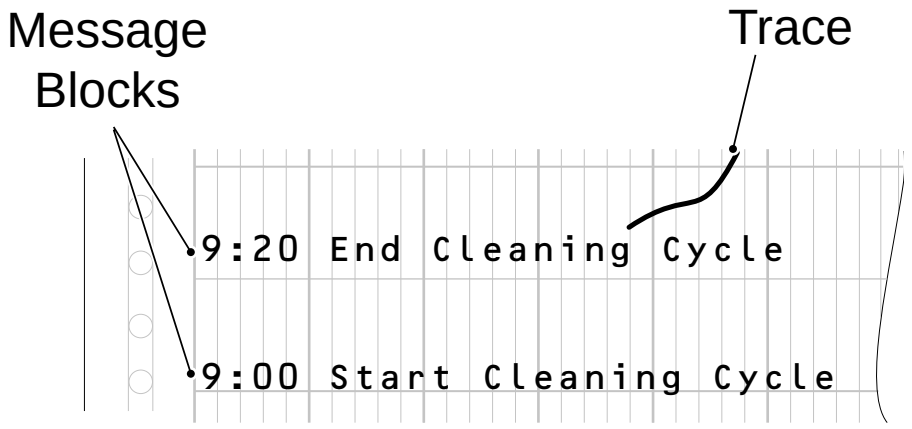



ABB Instrumentation

# COMMANDER SR100A

## Message Block Configuration

- 14 message blocks
  - 20 Characters
  - Colour Selectable
  - Time Stamped
- Block Print Sources
  - Total wrap
  - Paper out alarm
  - Input failure
  - Digital input
  - Chart speed
  - Logic equation
  - Power failure
  - Real time alarm
  - Process alarms

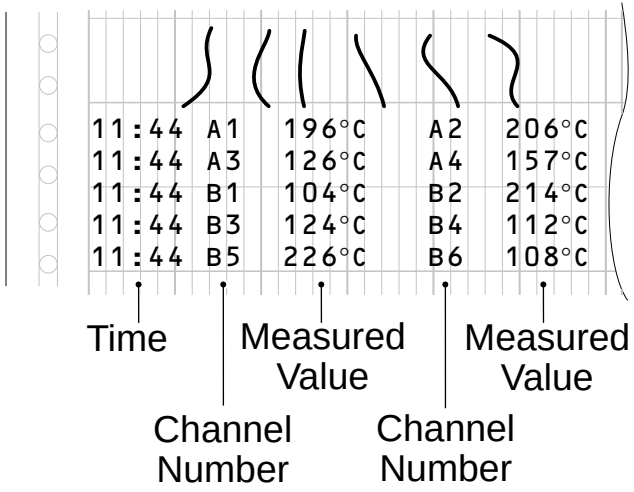


# COMMANDER SR100A

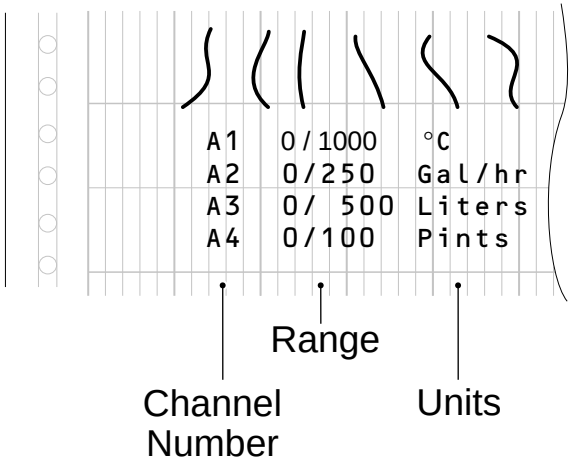
## Print Channel and Data Values

- Printing of up to 12 channel values
- Channel identity, value and engineering units for each channel
- Selectable printing trigger
  - Internal Digitals (Alarms)
  - External Digitals (Inputs)
  - Time Intervals (0 to 24 hours)

**Channel Values**



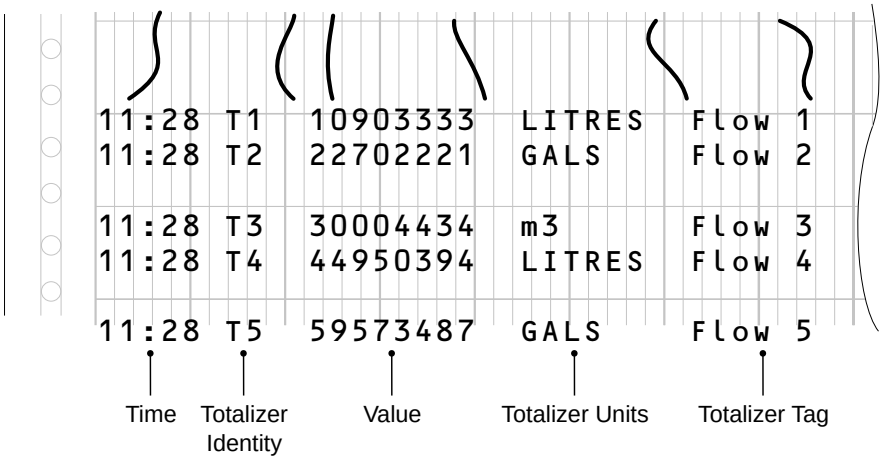

**Channel Data**



# COMMANDER SR100A

## Print Totalizer Values

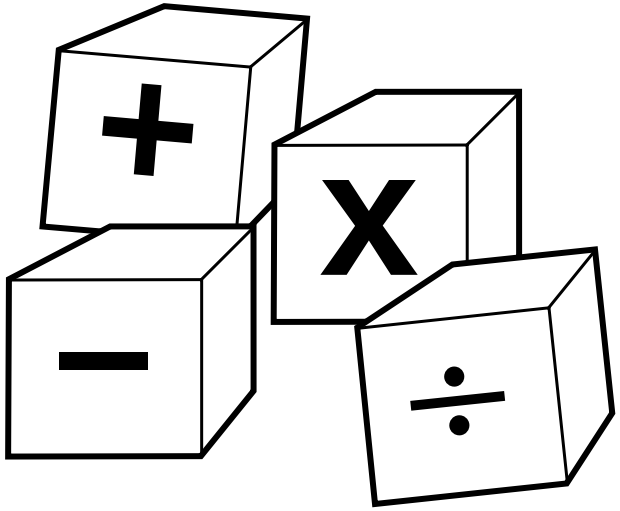
- Printing
- Channel identity, value and engineering units for each channel
- Selectable printing trigger
  - Internal Digitals (Alarms)
  - External Digitals (Inputs)
  - Time Intervals (5 minutes to 24 hours)



# COMMANDER SR100A

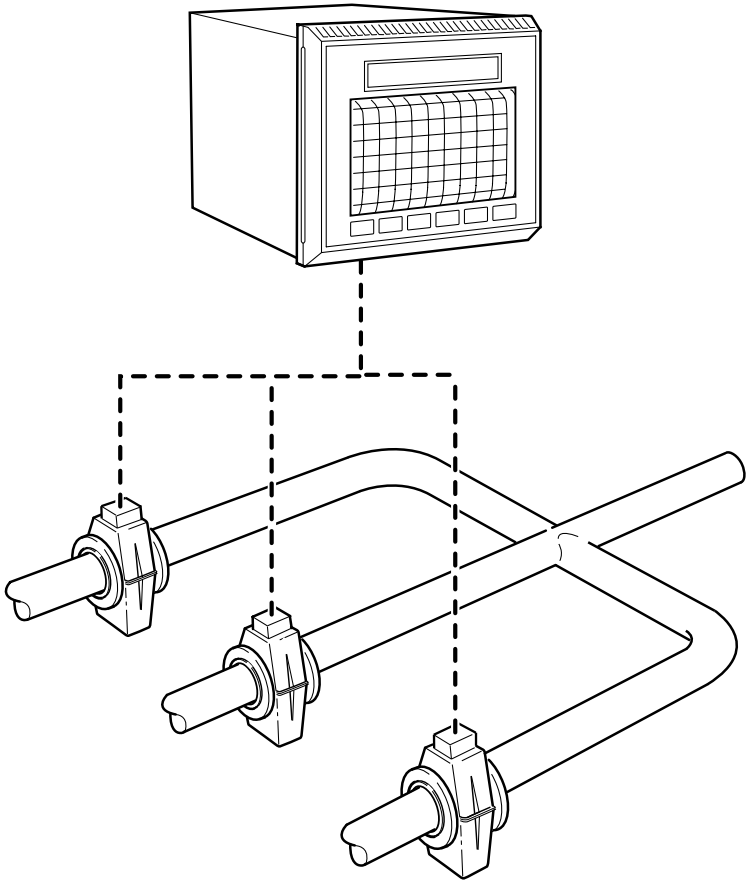
## Math Blocks

- 4 Programmable math blocks
- 11 Standard math functions
  - RH
  - Mass Flow 1 & 2
  - (a x b) + c
  - (a – b)/c
  - (a + b)/c
  - (a x b) x c
  - (a + b + c)/3
  - (a + b + c)
  - Low Select
  - Med Select
  - High Select
  - F Value
- Programmable engineering units and result tag for each block



# COMMANDER SR100A

## Math Block Example – Total Flow Calculation



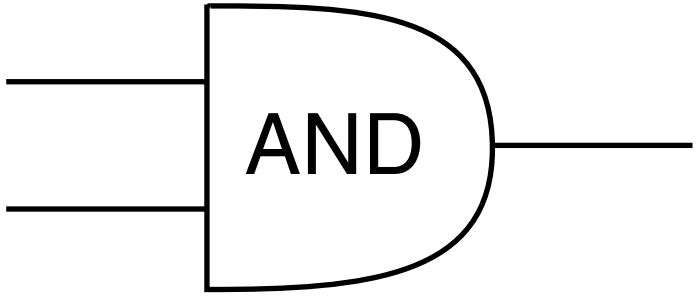
- Individual flow signals from the flowmeters in each pipe are recorded on separate channels
- The total flow rate (in the common pipe) is calculated using a math block
- Internal soft wiring is used to record the total flow rate on a fourth channel
- Use the math result as an input to a totalizer to calculate the total flow quantities and hence the volume of liquid

ABB Instrumentation

# COMMANDER SR100A

## Logic Equations...

- 10 programmable logic (Boolean) equations
- Up to 16 elements per equation
- Integration of both internal and external signals
  - Alarms
  - Digital inputs
  - Other logic equations
  - Real time alarms
- Initiation of instrument functions
  - Alarm acknowledgement
  - Pen events
  - Changes of chart speed
  - Value printing
  - Relay outputs



# COMMANDER SR100A

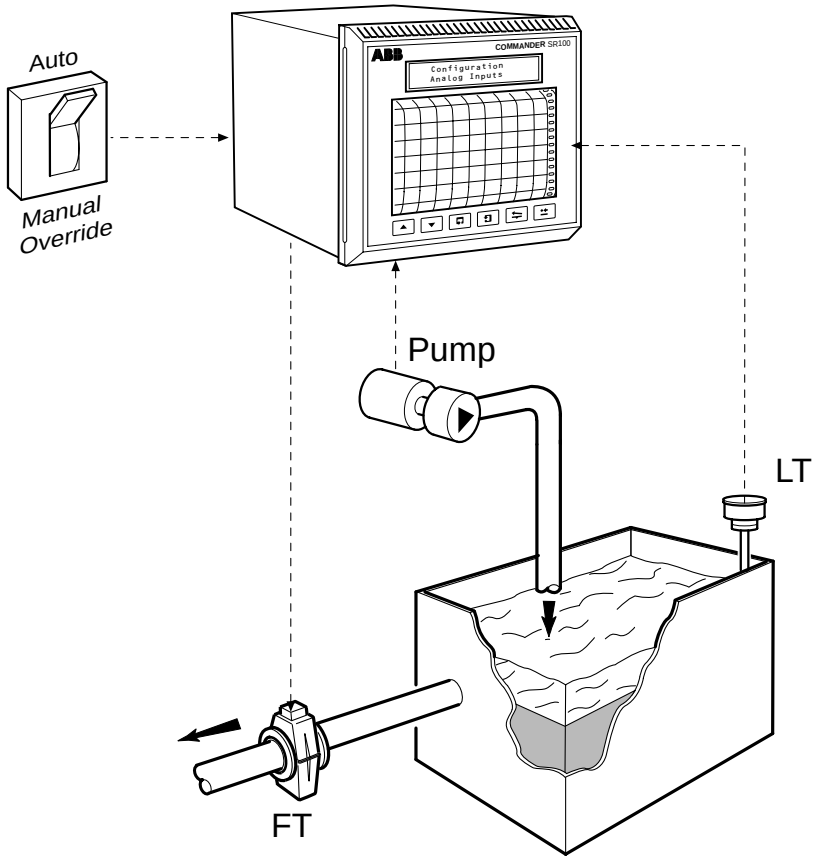
## Logic Equations

14 Different operands available:

| | |
|---|---|
| * | Terminator, used to complete the expression |
| ) | Close bracket |
| ( | Open bracket |
| & | Logical AND |
| + | Logical OR |
| T1W – T6W | Wrap-around of totalizer (T1 to T6) |
| P_O | Paper Out alarm |
| FA1 – FB6 | Input failure (A1 to A6, B1 to B6) |
| DA1 – DG3 | Digital input active |
| CS1 – CS3 | Chart speeds |
| L1 – L10 | Logic equation true |
| PWR | Power failure |
| RT1 – RT2 | Real time alarm on (1 or 2) |
| PAA – PAM | Predefined process alarm (A to M excluding I) |

# COMMANDER SR100A

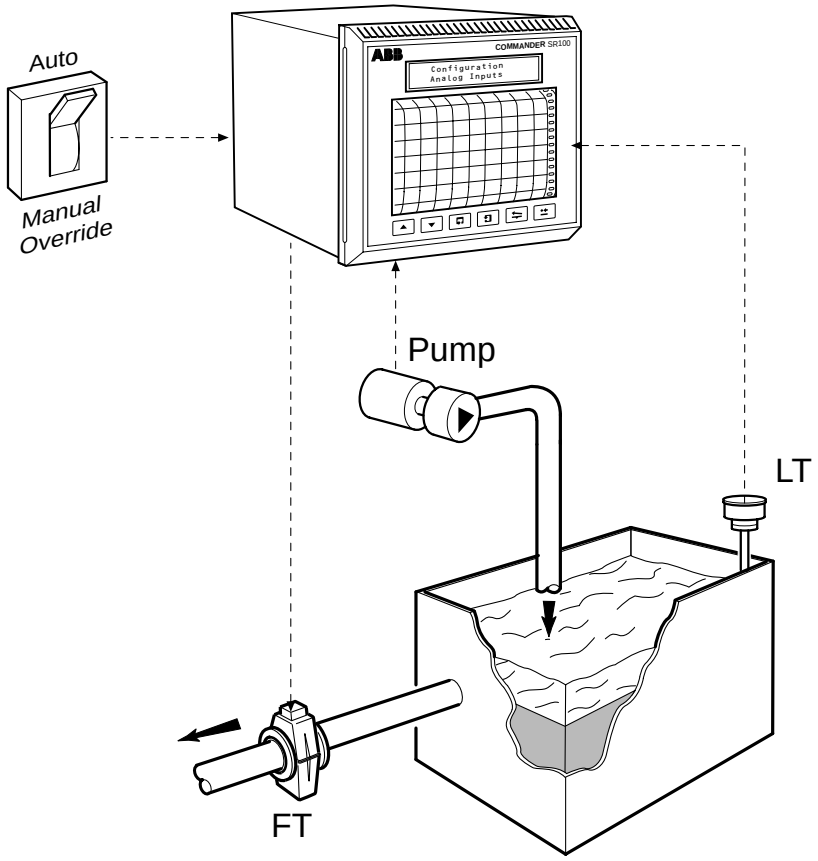
## Logic Equation Example – Pump On/Off Control




- Pump Running Conditions
  - Low Level AND
  - time is between 8:00am and 5:00pm AND
  - no manual override
- Input Elements
  - Alarm A (PAA) set to Low Process Alarm with a trip of 1.8m and hysteresis of 0.2m
  - Real-time Alarm 1 (RT1) set on at 8:00am until 5:00pm
  - Digital input (DA1) set for positive logic so that when the switch is in Auto (normal operation) the input is active
- Logic Equation
  - EQ01 = PAA & RT1 & DA1

# COMMANDER SR100A

## Logic Equation Example – Pump Control with Low Low Cutoff




- Operation as for previous Pump On/Off Control example, except that additional safety is now provided by a ‘Low-Low’ Alarm
- Alarm B set for Low-Low Process Alarm with a trip level of 1.4m
- Relay assigned to Logic Equation 2
- Logic Equations
  - EQ01 = PAA & RT1 & DA1
  - EQ02 = EQ01 or PAB

# COMMANDER SR100A

## Logic Equation Example – Sequence Control

- Logic equations provide safety interlocks to prevent plant from being operated manually when certain process conditions are true
- A chart recorder is monitoring dosing flows into a mixing tank
- The chemicals in stream C must not be dosed at the same time as the chemicals in streams A and B
- A relay is therefore required which prevents valve C from opening if valves A (DA1) or B (DB1) are open
- Logic Equation: EQ01 = DA1 or DB1
- Relay = EQ1

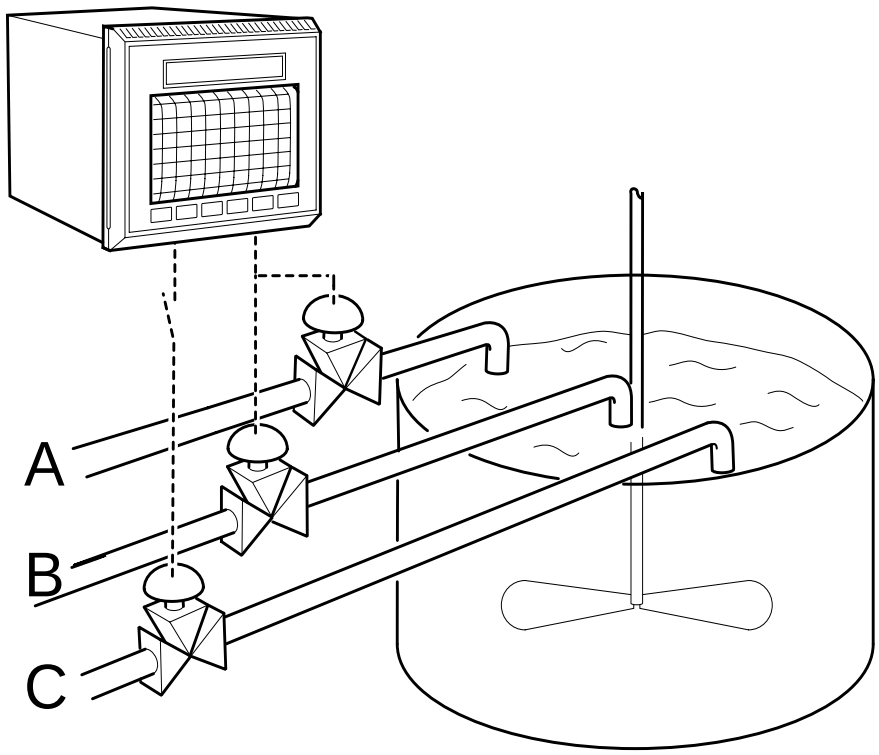
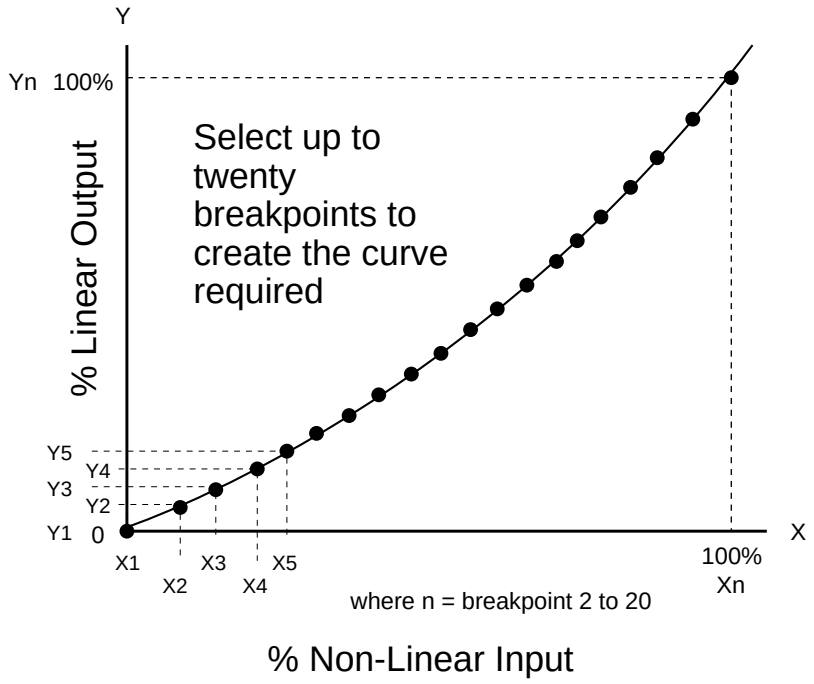



ABB Instrumentation

# COMMANDER SR100A

## Custom Linearizer

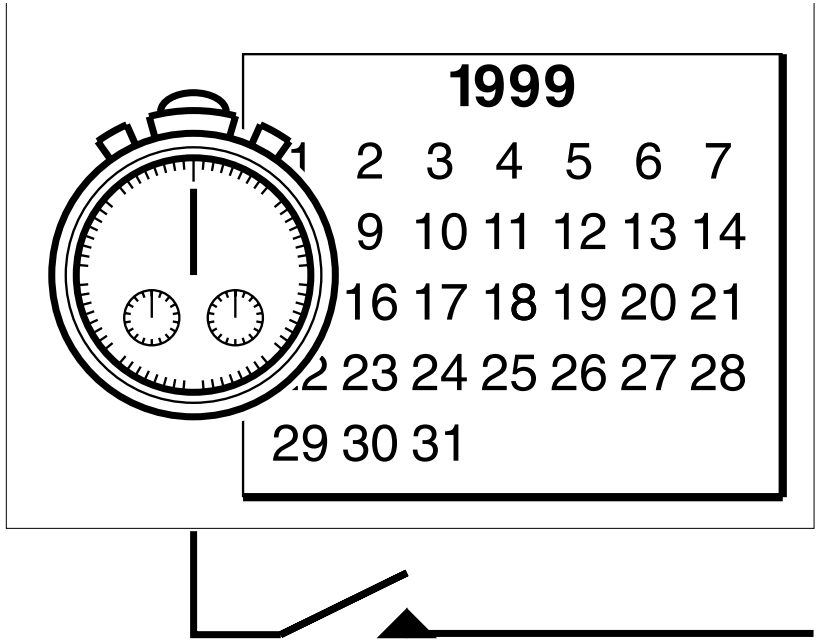
- Single 20-point custom linearizer
- Variable spacing on X and Y axis to allow optimization of breakpoints



# COMMANDER SR100A

## Real-time Alarms

- 2 programmable real-time events
- Programmable start and end dates/ times
- Times are selectable for hour, day, month, year or a combination of any of these



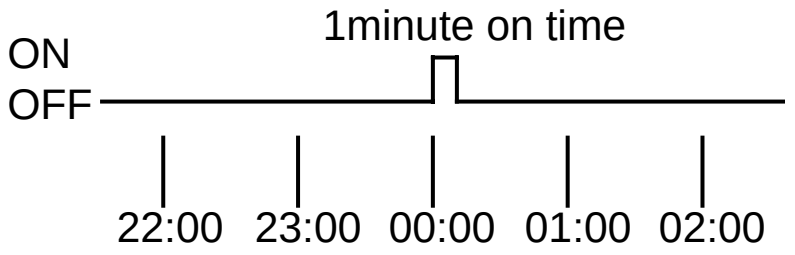
# COMMANDER SR100A

## Real-time Alarm Example – print out a daily total and reset

- Real Time Alarm 1 (RTA1) set as follows:

| ***ON time*** | | ***OFF time*** |
|---|---|---|
| ** | Year | ** |
| *** | Month | *** |
| ** | Day | ** |
| 00 | Hour | 00 |
| 00 | Minutes | 01 |

- Assign ‘Total 1 Print Source’ and ‘Total 1 Reset Source’ to RTA1



# COMMANDER SR100A

## Real-time Alarm Example – using two totalizers to log day and night flows

- Set RTA1 as follows:

| *ON time* | | *OFF time* |
|---|---|---|
| ** | Year | ** |
| *** | Month | *** |
| ** | Day | ** |
| 06 | Hour | 18 |
| 00 | Minutes | 00 |

Assign Total 1 Stop/Go Source to RTA1 for total daytime flow and Total 1 Print Source to RTA2

- Set RTA2 as follows:

| *ON time* | | *OFF time* |
|---|---|---|
| ** | Year | ** |
| *** | Month | *** |
| ** | Day | ** |
| 18 | Hour | 06 |
| 00 | Minutes | 00 |

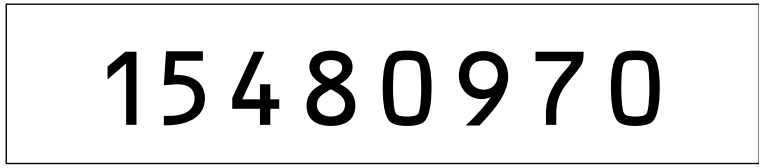
Assign Total 2 Stop/Go Source to RTA2 for total night time flow and Total 2 Print Source to RTA1

- RTA1 ON is used to print the night flow total and RTA2 ON the day flow total

# COMMANDER SR100A

## Totalizer Functions...

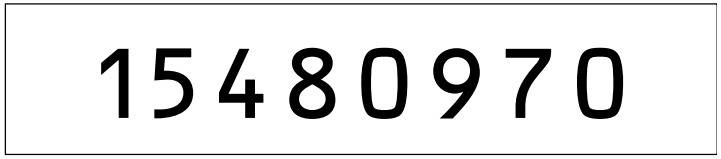
- Six digital totalizers available assignable to any channel or math results
- Count up or down
- Count Pulse
  - Used to energize relays or digital outputs
- Wrap Pulse
  - Used to energize relays or digital outputs



# COMMANDER SR100A

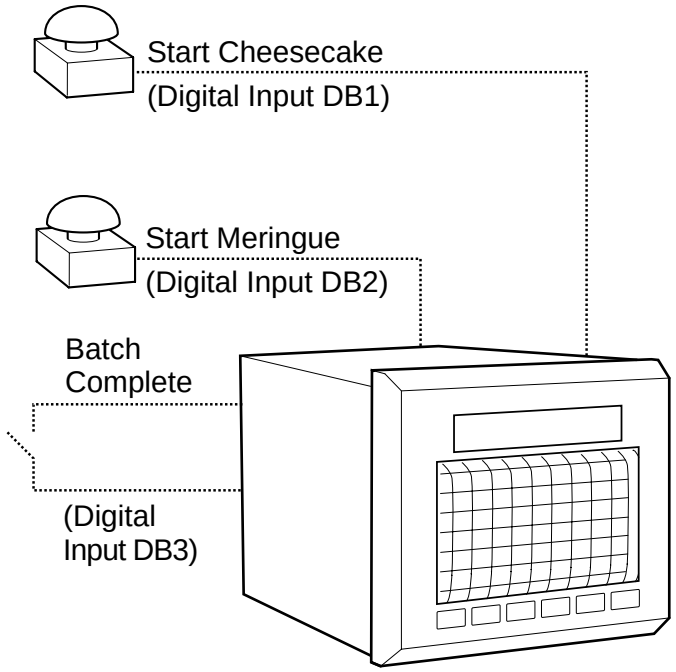
## Totalizer Functions

- Programmable present and predetermined count values for batch totals
- Adjustable cut-off values
- Operator level reset and stop/go
- Digital signal reset and stop/go



# COMMANDER SR100A

## Message Printing



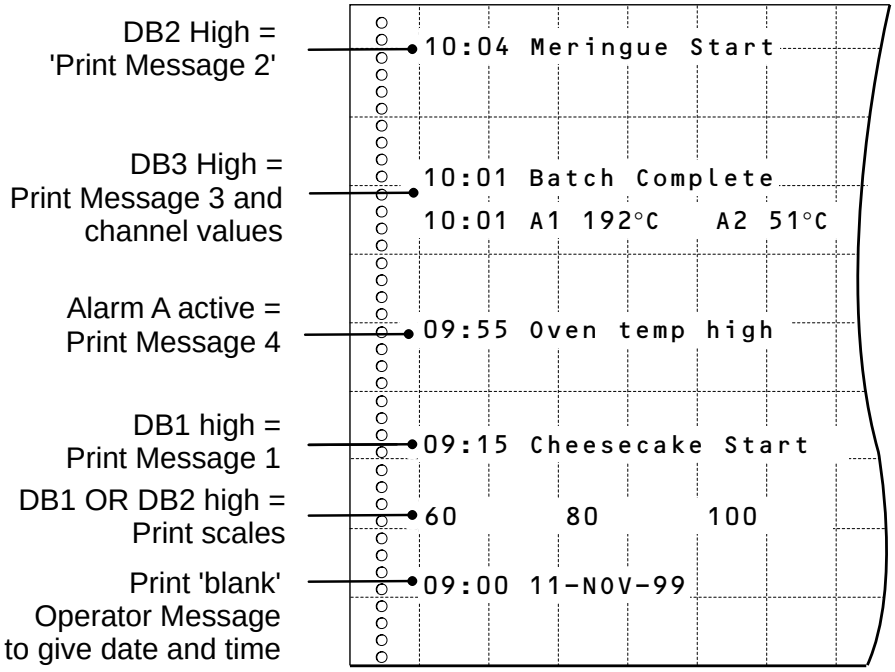
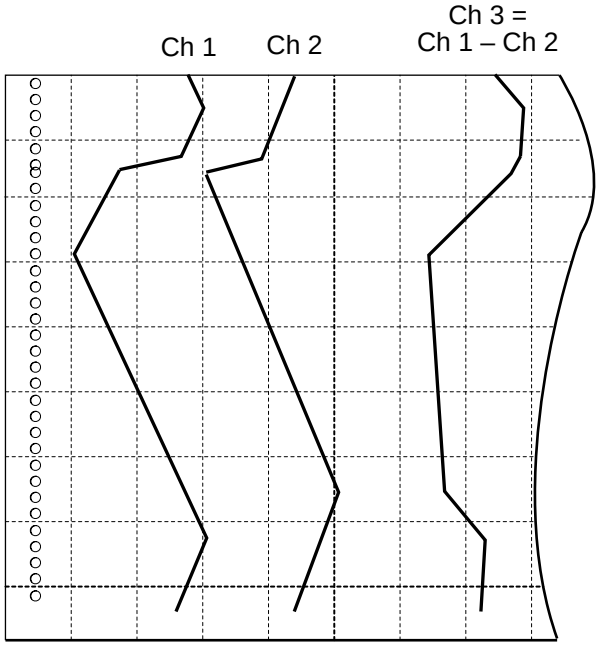




ABB Instrumentation

# COMMANDER SR100A

## Deviation Alarms

- Differential of two process variables can be recorded as a single channel
- Maths blocks used to calculate differential alarm from and/or record this value




Channel 1 – Process variable input

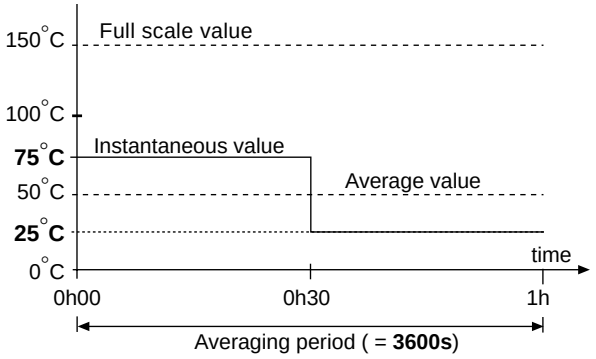
Channel 2 – Reference value (Used to measure the deviation)

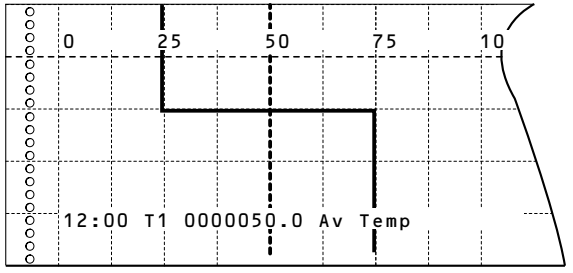
Channel 3 – The resultant deviation

# COMMANDER SR100A

## Average Value Printout

- Printout of a signal averaged over a set period
- Achieved by using combination of real-time alarms and totalizer

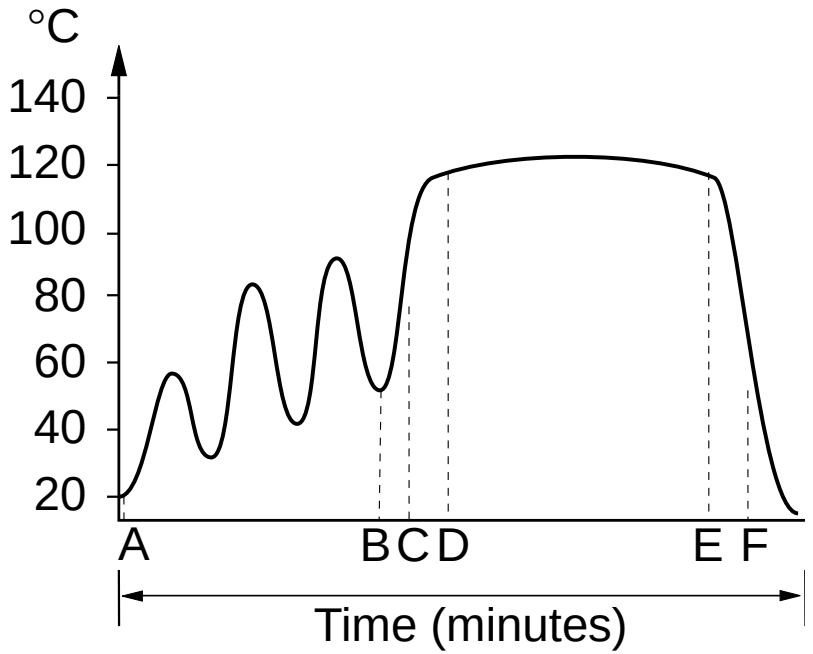


# COMMANDER SR100

## F Value...

- Four independant F Value calculations for sterilizing cycle applications
- User configurable variables
- Internal and external digital start and end calculation signals
- Sample time of 720ms resulting in an accuracy of <2%



# COMMANDER SR100

## F Value

$$Fvalue(t) = Fvalue(t-1) + \frac{\left(10^{\frac{(T_o - T_t)}{Z}}\right)}{\left(\frac{60}{\text{sample rate}}\right)}$$

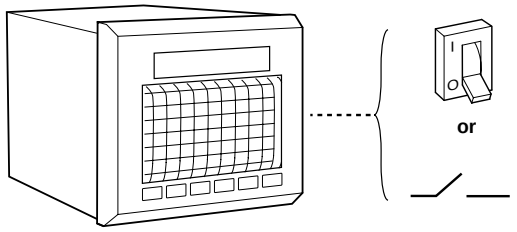
Where:

| | | |
|---|---|---|
| Fvalue(t) | = | current Fvalue sum |
| Fvalue(t – 1) | = | Fvalue sum at last sample |
| $T_o$ | = | measured temperature |
| $T_t$ | = | target sterilizing temperature |
| Z | = | temperature interval representing a factor of 10 reduction in killing efficiency (Z factor) |
| Sample Rate | = | 0.48 seconds |

# COMMANDER SR100

## Remote Chart Speed Selection

- Where continuous recording of measured variables is not required, a digital input can be used to switch recording on and off or change chart speed
- Set Up:
  - Connect a ‘normally open’ volt-free signal to a digital input on the recorder
  - Set chart speed 1 to 0mm/hr; chart speed 2 to the speed required.
  - Allocate chart speed 2 source to the appropriate digital input; chart speed 1 source to ‘Chart Speed 2’.
  - When more than one chart speed source is active, the higher numbered source gets priority



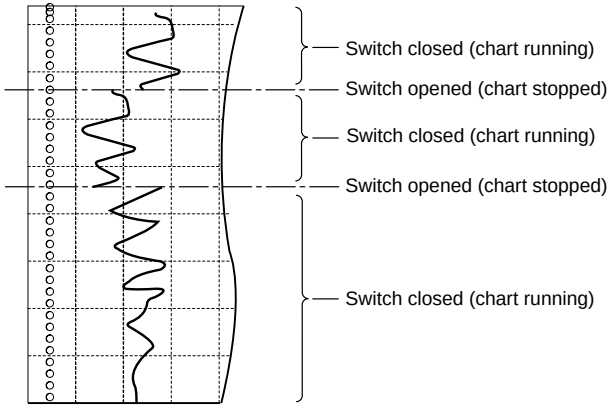




ABB Instrumentation

# Application Examples

ABB Instrumentation

# COMMANDER SR100A & B

## Effluent Flow

- Monitoring and recording of Flow, pH and Temperature

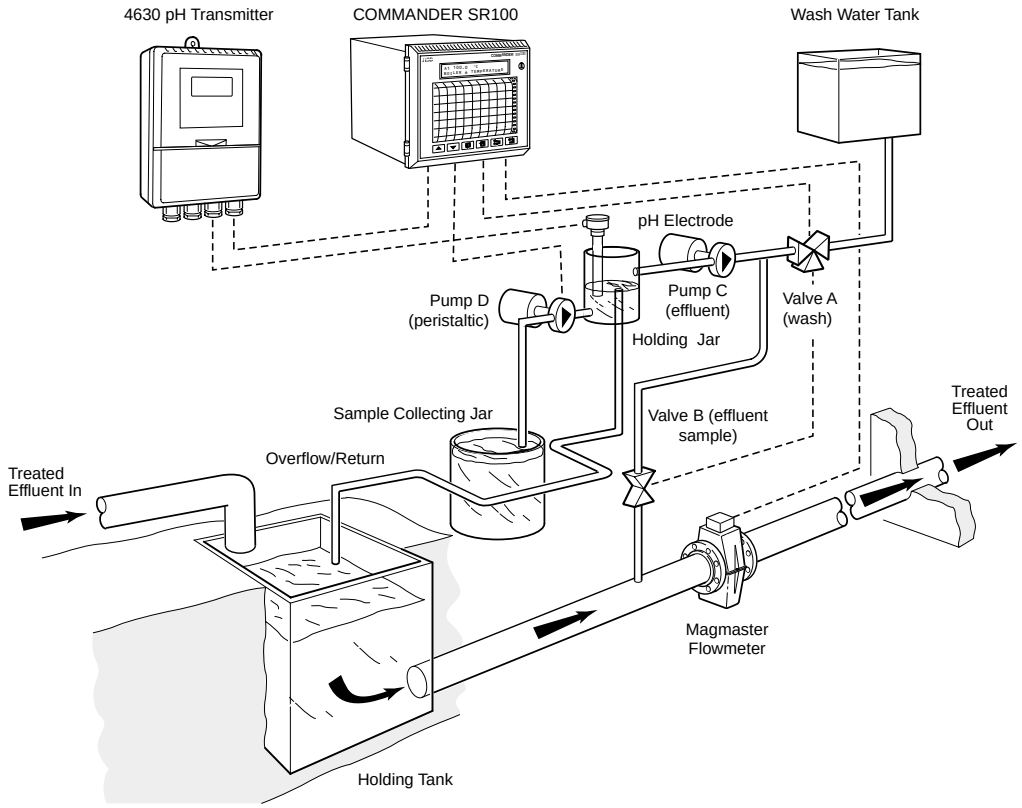
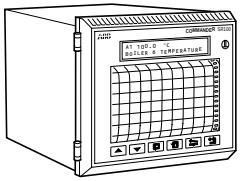


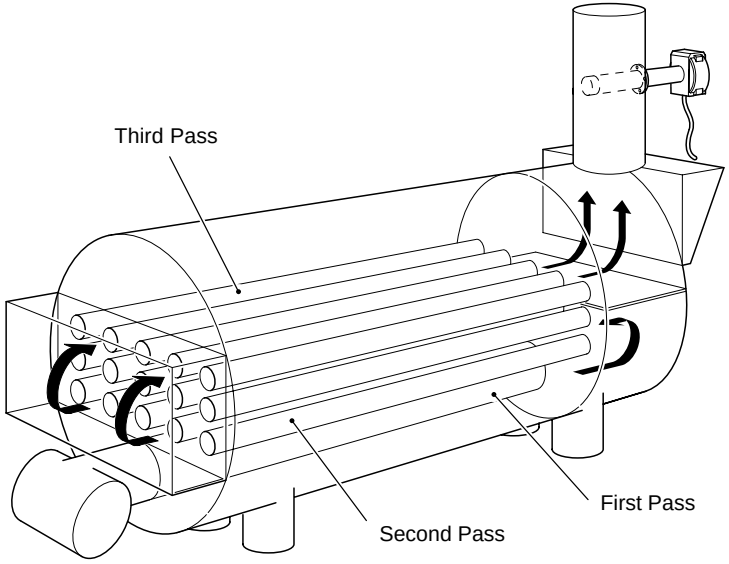

ABB Instrumentation

# COMMANDER SR100A & B

## Package Boilers

- Multiple process point monitoring including:
  - Oxygen
  - Temperature
  - Level
  - Flows






**3-Pass Boiler**

# COMMANDER SR100

## Sterilizer Validation and Periodic Tests

- Thermometric tests to monitor and record temperature and pressure readings

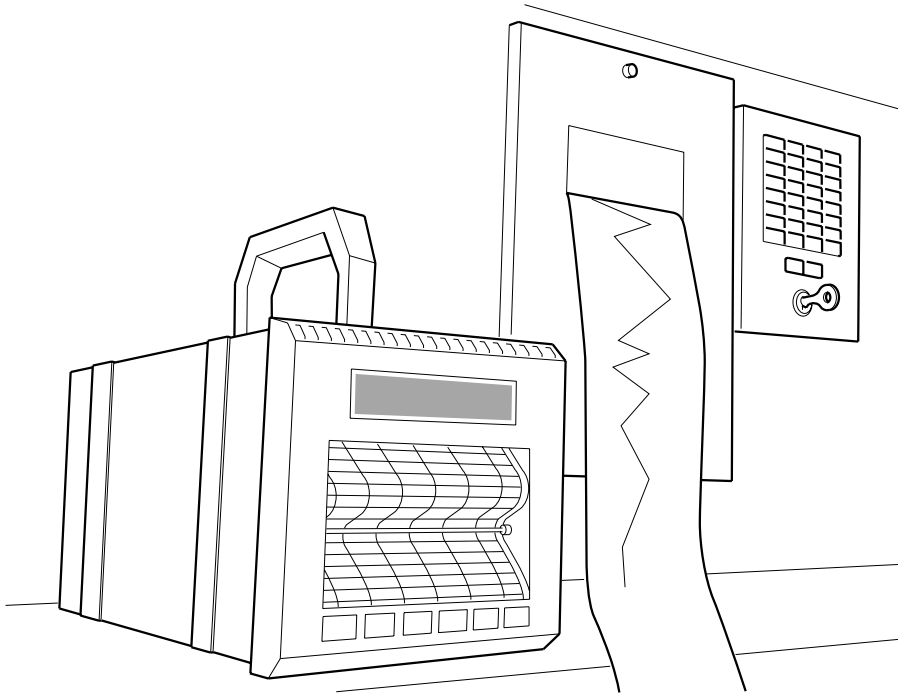
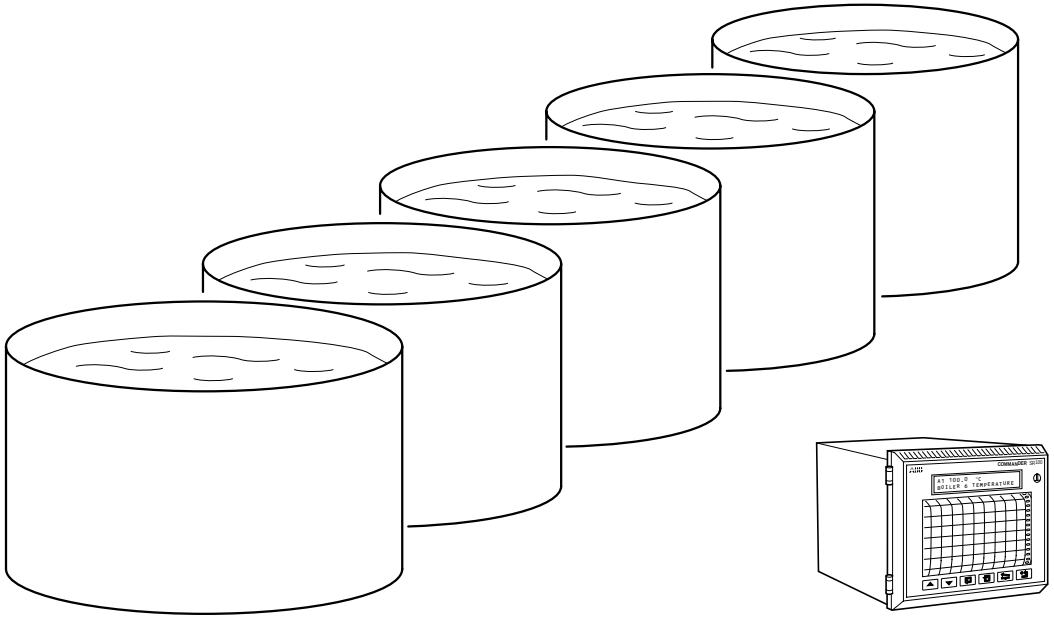


ABB Instrumentation

# COMMANDER SR100

## Tank Farms

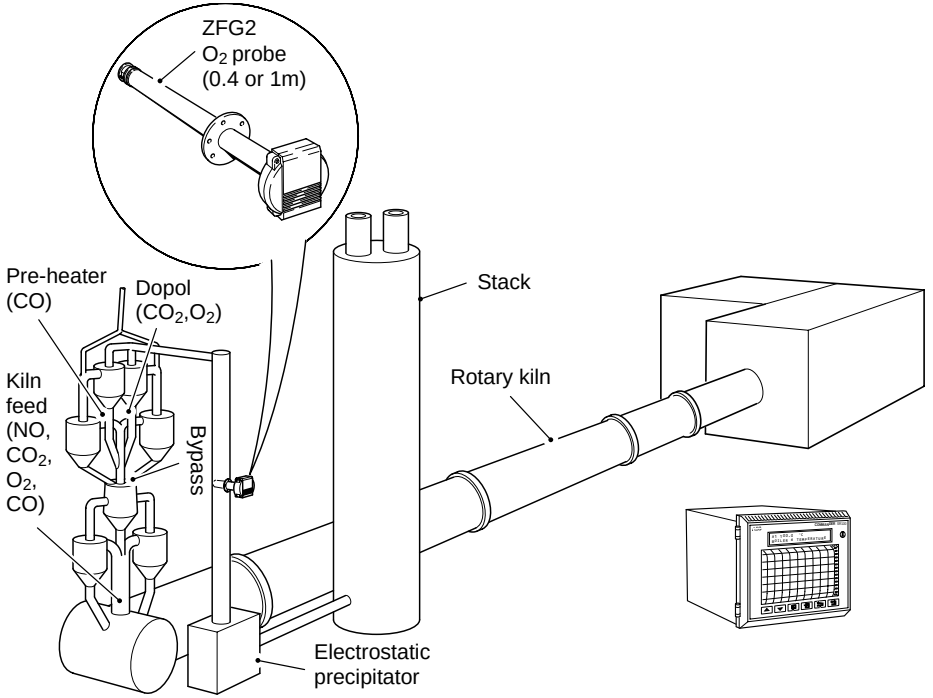
- Monitoring and Recording of Temperature and Level



# COMMANDER SR100

## Kiln Waste Gases

- Monitoring and Recording of Gas and Temperature:
  - CO
  - $O_2$
  - NO
  - $CO_2$



# COMMANDER SR100

## Autoclaves/Retorts

- Batch Monitoring of Temperature and Pressure

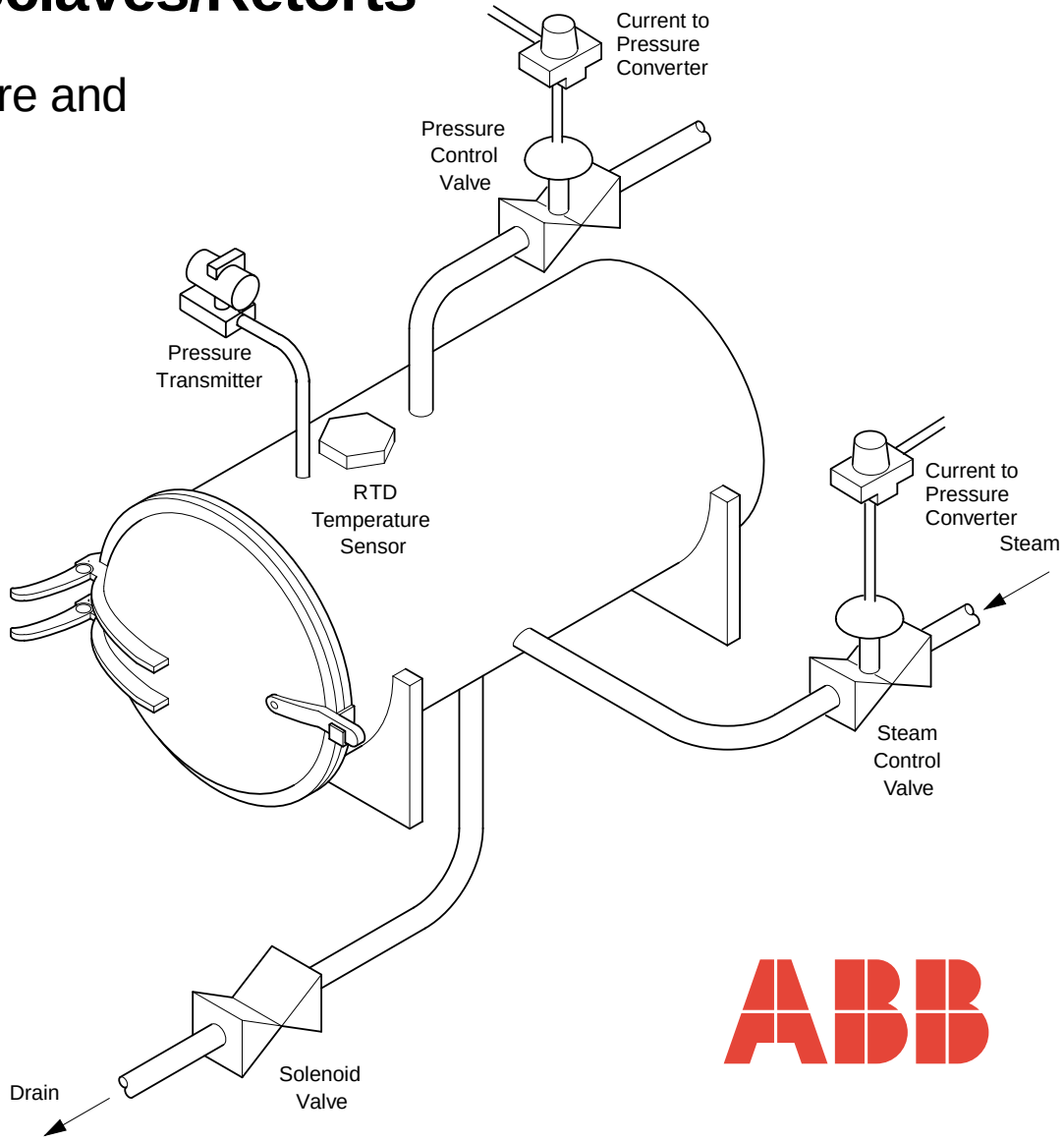



ABB Instrumentation

# COMMANDER SR100

## Clean in Place

- Monitoring and recording of caustic solutions – temperature and flow

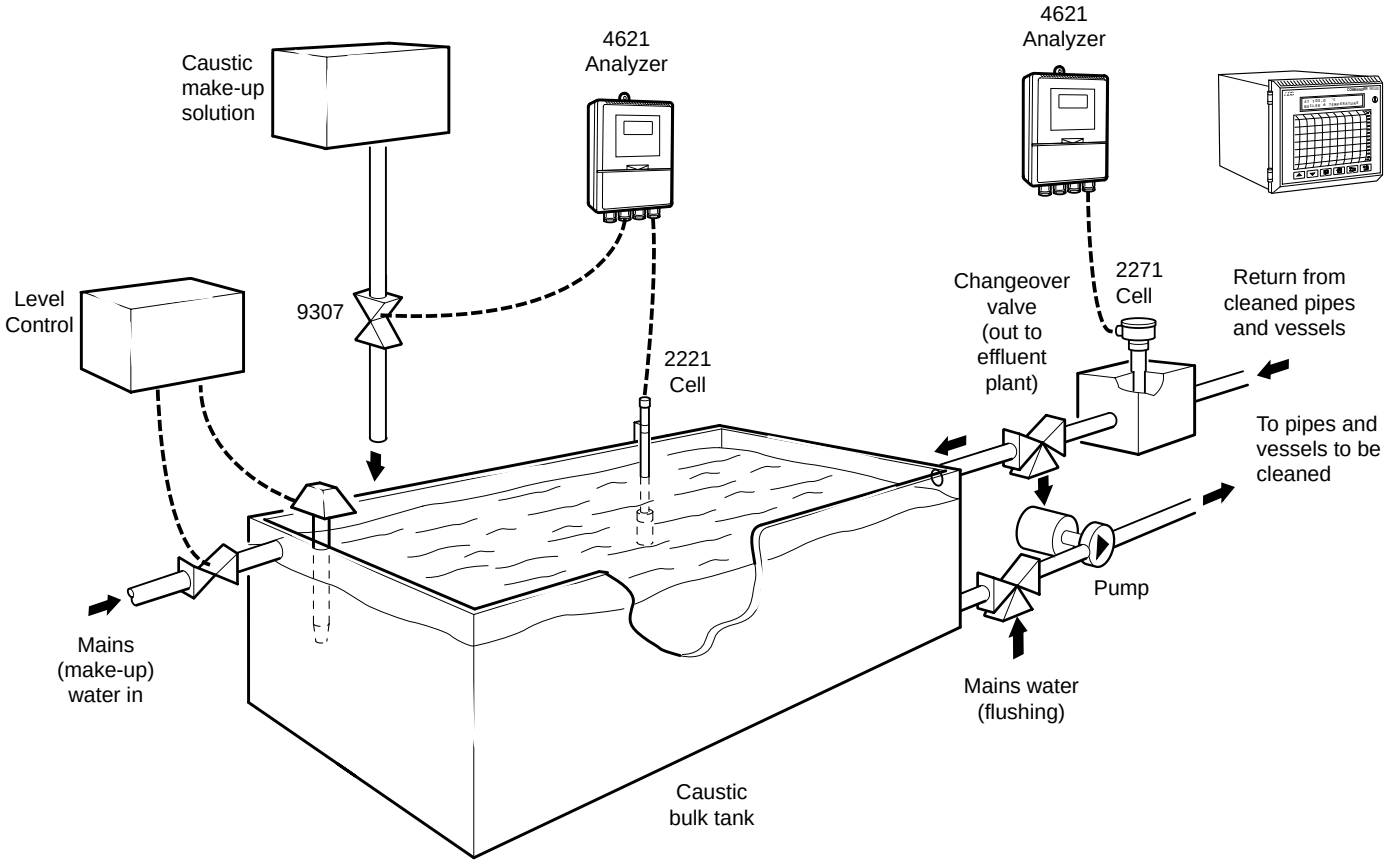



ABB Instrumentation

# COMMANDER SR100

## Cold Storage

- Multizone/room temperature monitoring and recording

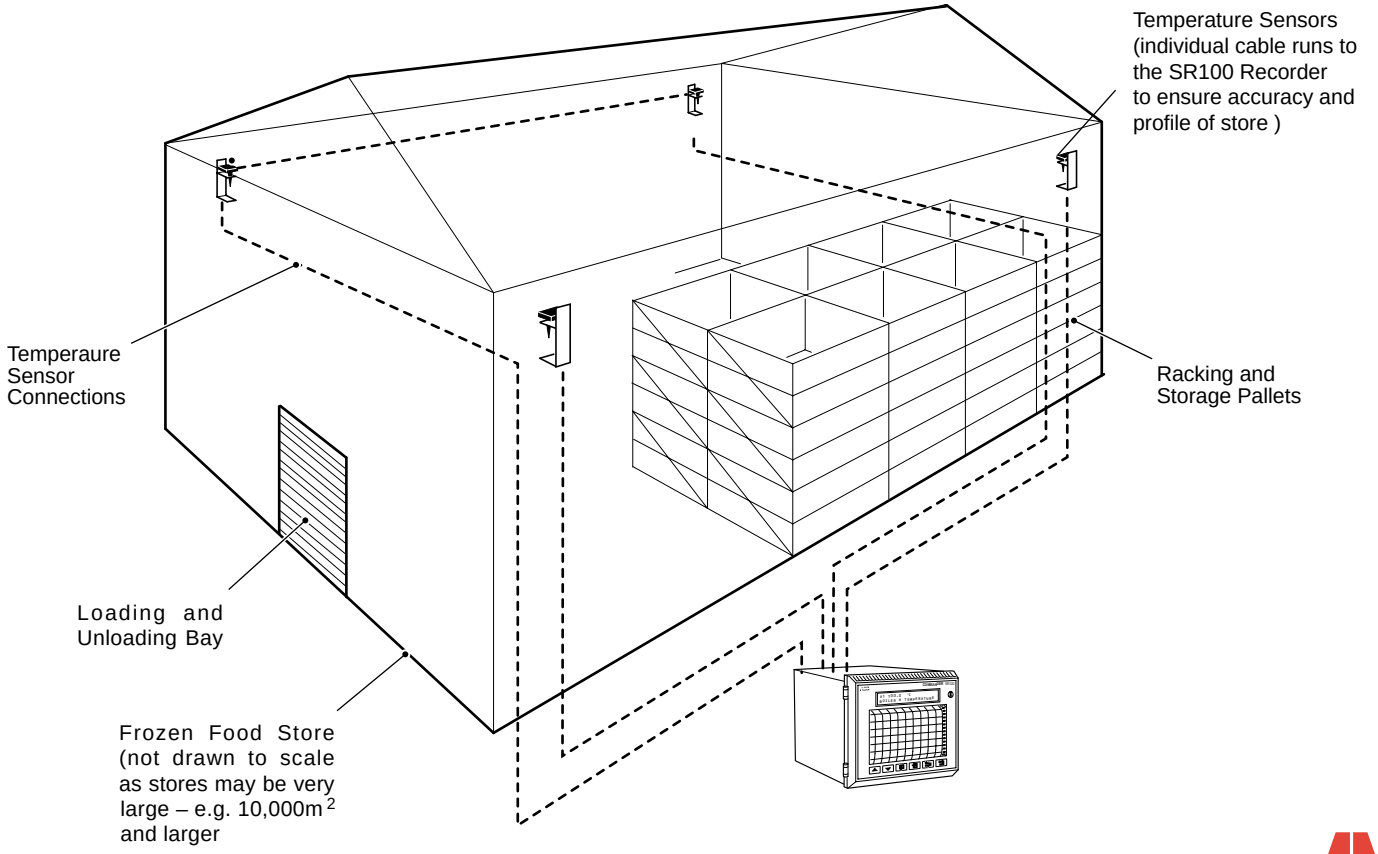



ABB Instrumentation

# COMMANDER SR100

## Tobacco Leaf Processing

- Monitoring and recording of multiple zones temperature and moisture

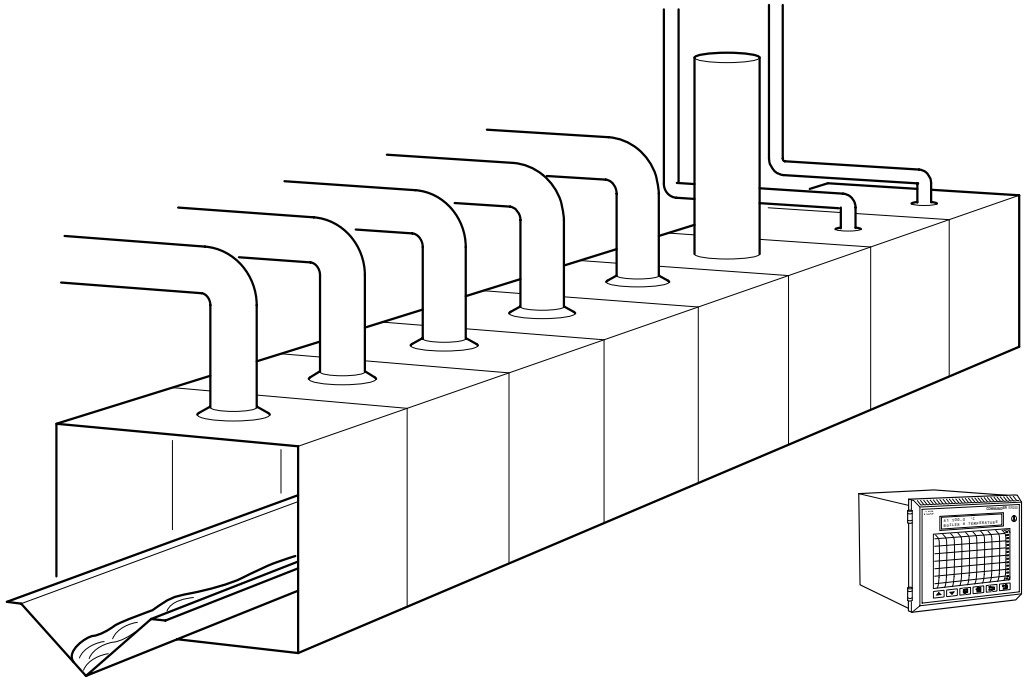


ABB Instrumentation

# COMMANDER SR100

## Summary

### SR100B

- Basic applications
- 3- or 6-channel versions
- Trace on paper
- Limited printing and scale formats
- Temperature/process recording market

### SR100A

- Advanced applications
- 1 to 6 channels available
- Detailed chart print out
- Data gathering
- Data storage on PC card
- Recording with sequence and math requirement