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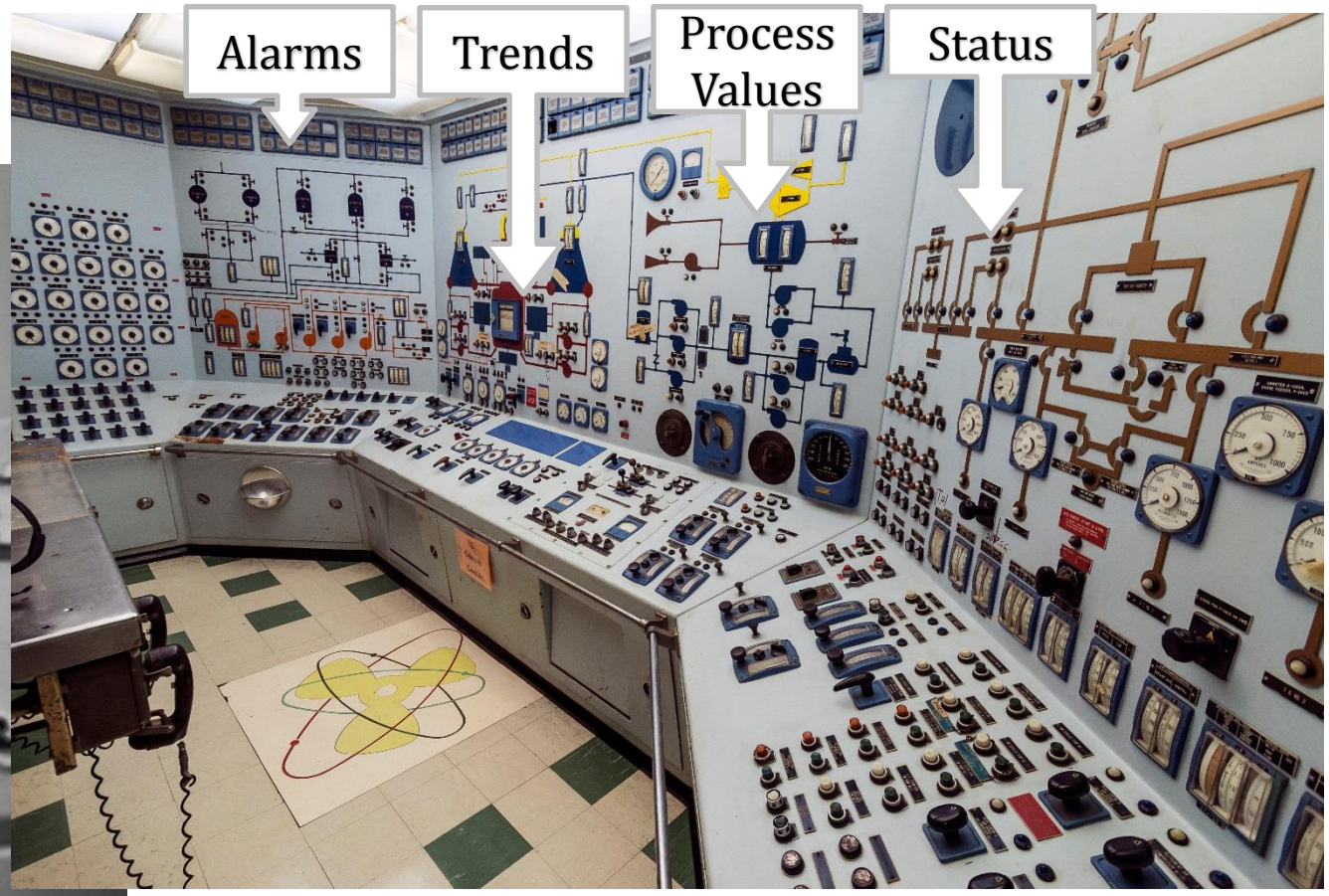
Implementing ISA101

A Case Study: High Performance, High Resolution, High Availability HMI Upgrade

csia CERTIFIED

ISA 101 Overview: The HMI of the Past

- Provided an overview of the process
- Many trends throughout



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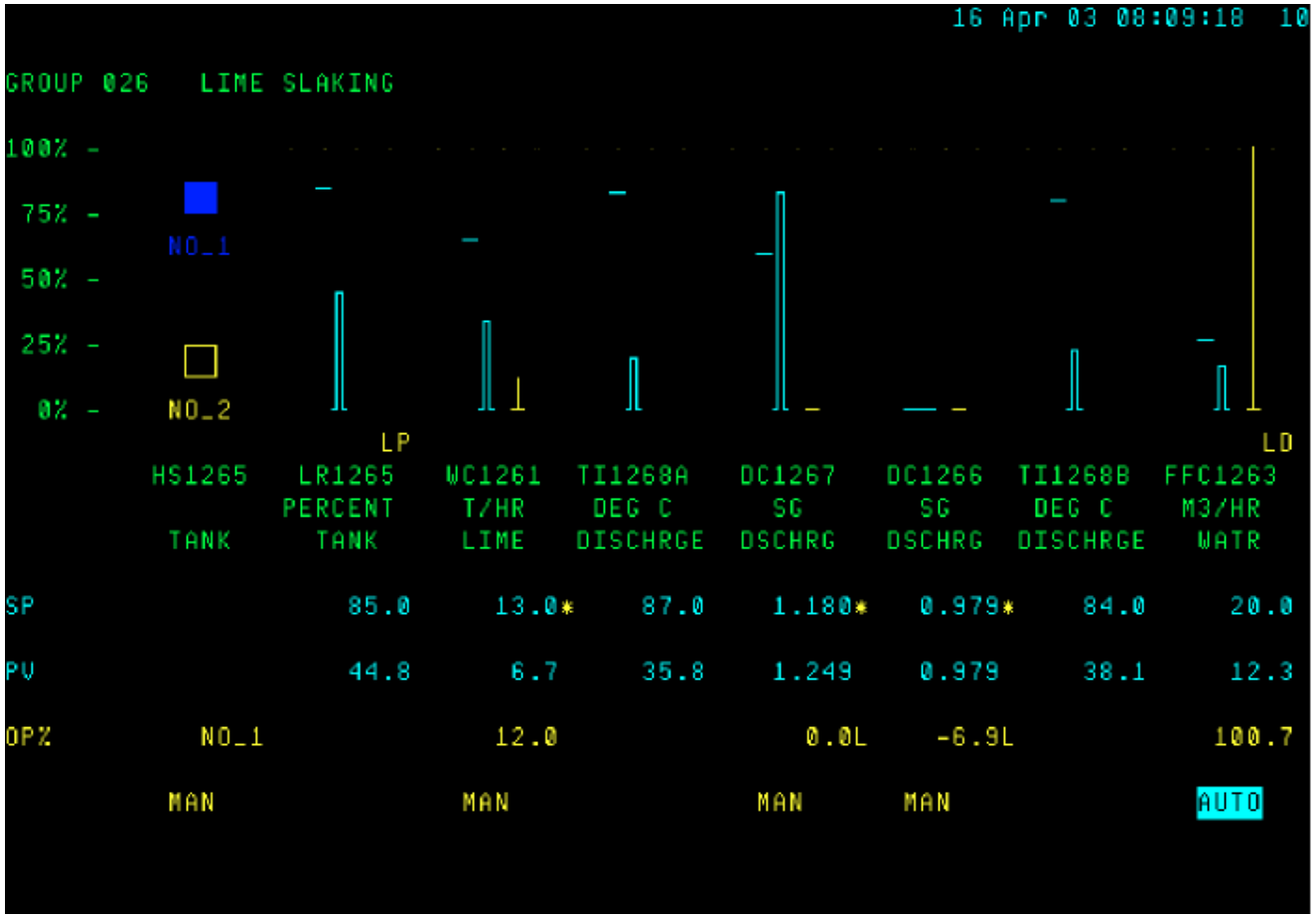
DCS effect on the HMI

- Early DCS displays lost the big picture
- Control via alarms



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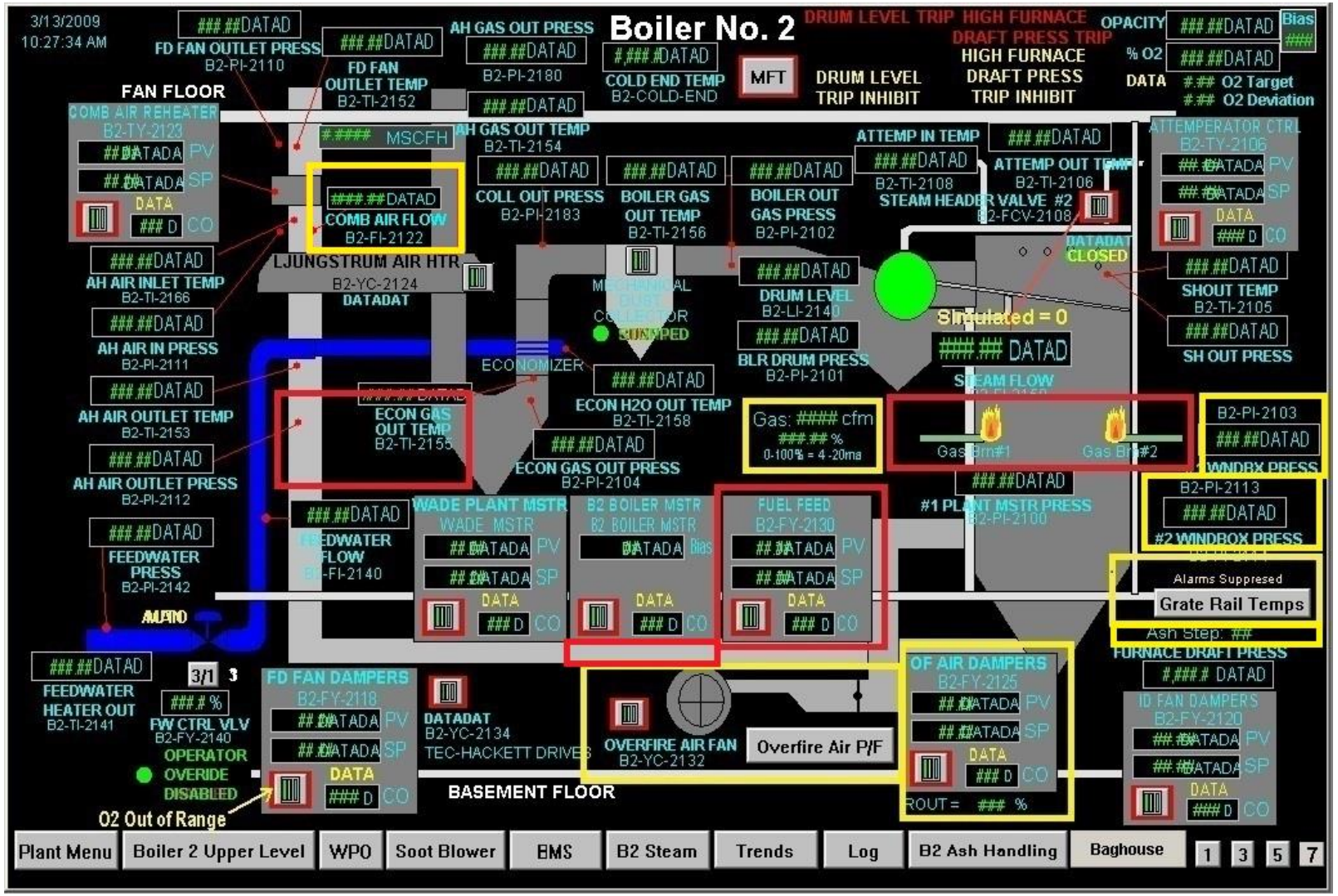
DCS graphics evolved



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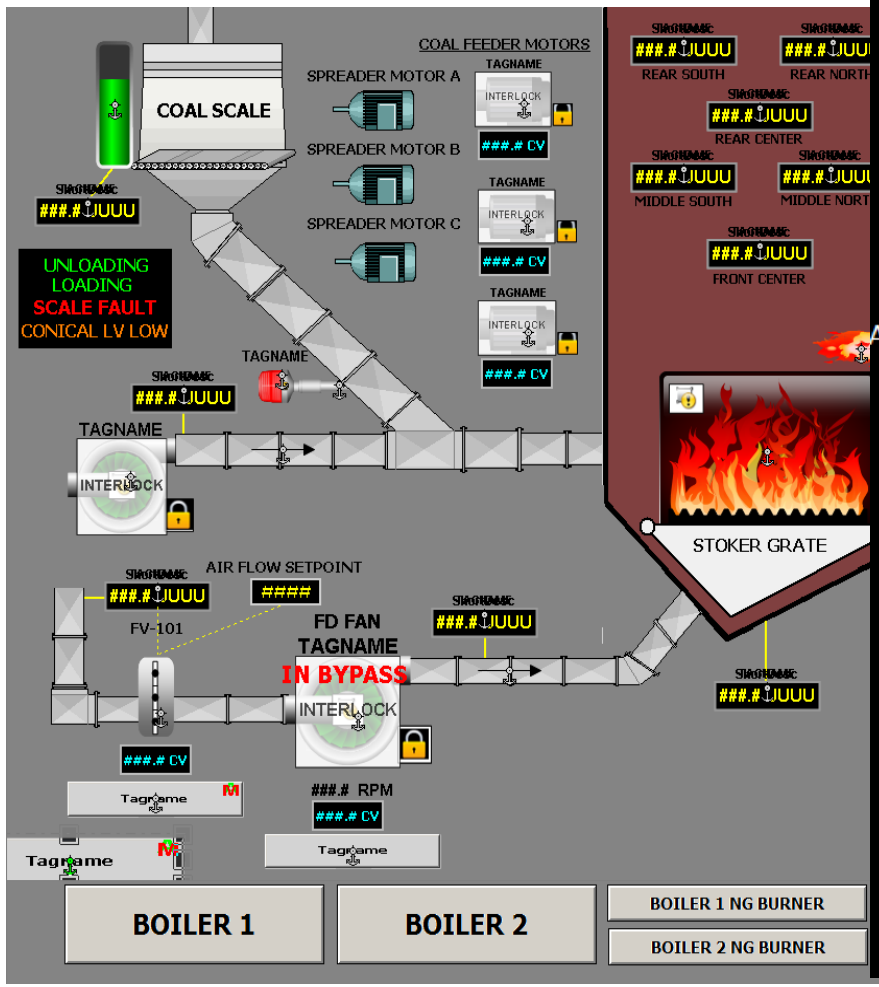
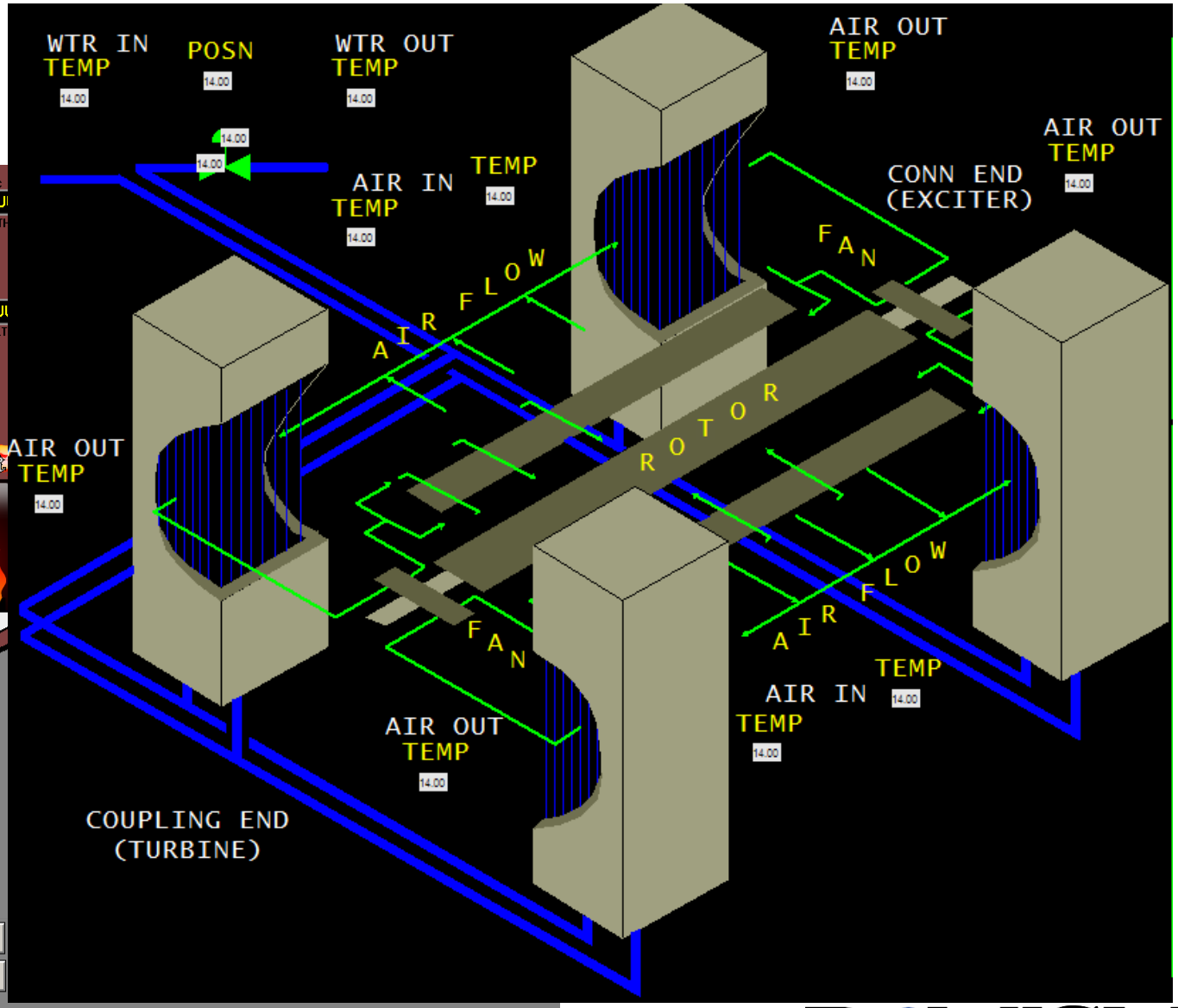
The HMI Evolves





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What's so bad about P&ID based graphics?

- Color use inconsistent and unhelpful
- Trends are relegated to a separate screen
- All data no information
- No way to scan screen and determine state of the plant
- Distracting, low value 3D or animated elements

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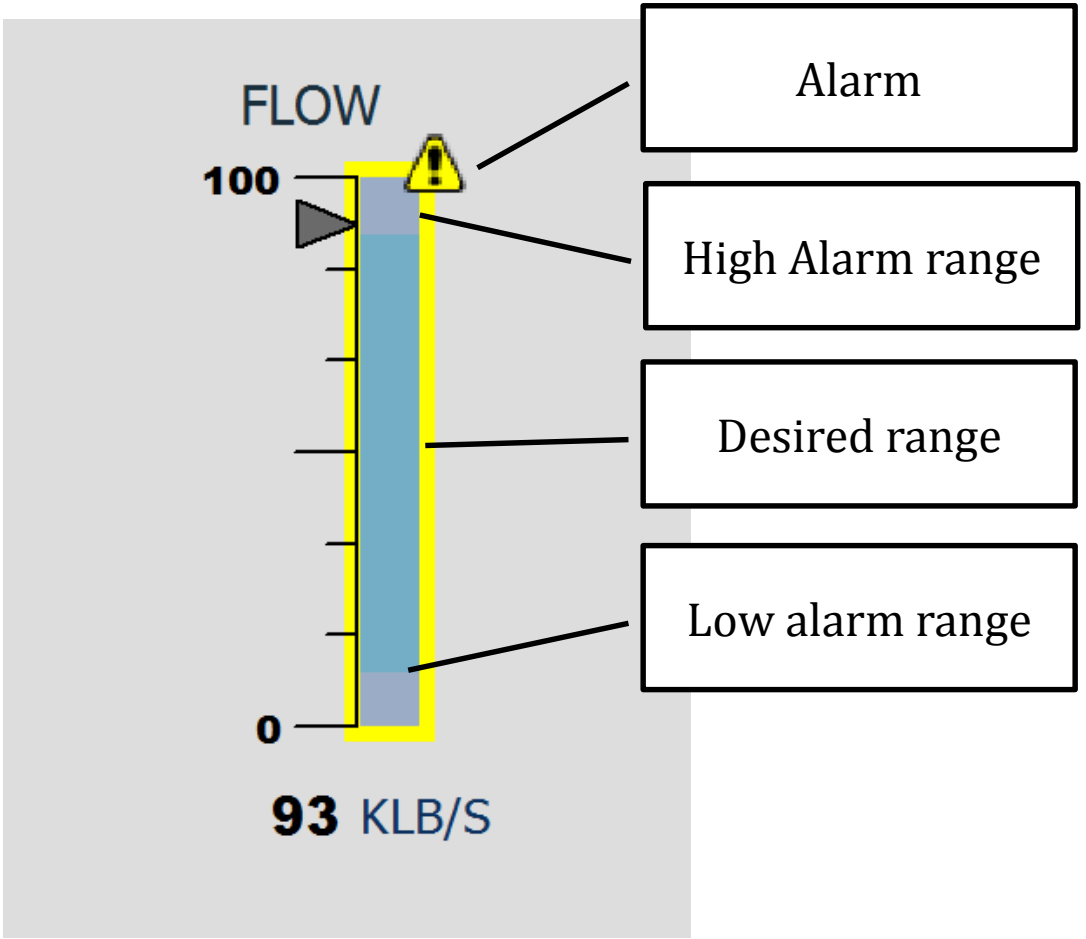
High performance: Data in context is information



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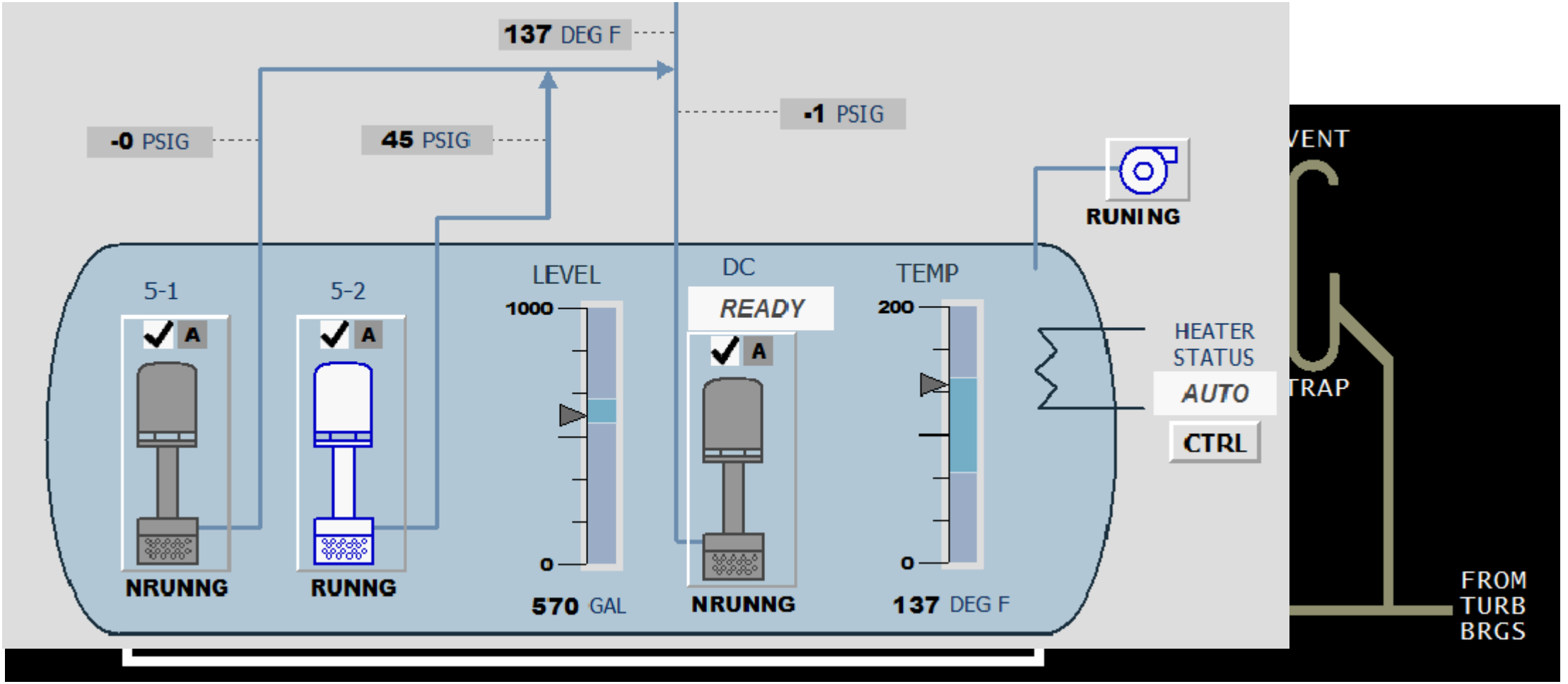
High Performance: Data in context is information



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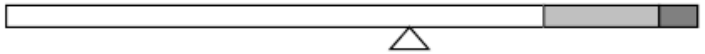
High Performance: Trends

Value Needing Trend

Current Pressure	Alarm Limit	Shutdown Actuation
235.2 psig	250 psig	300 psig
		

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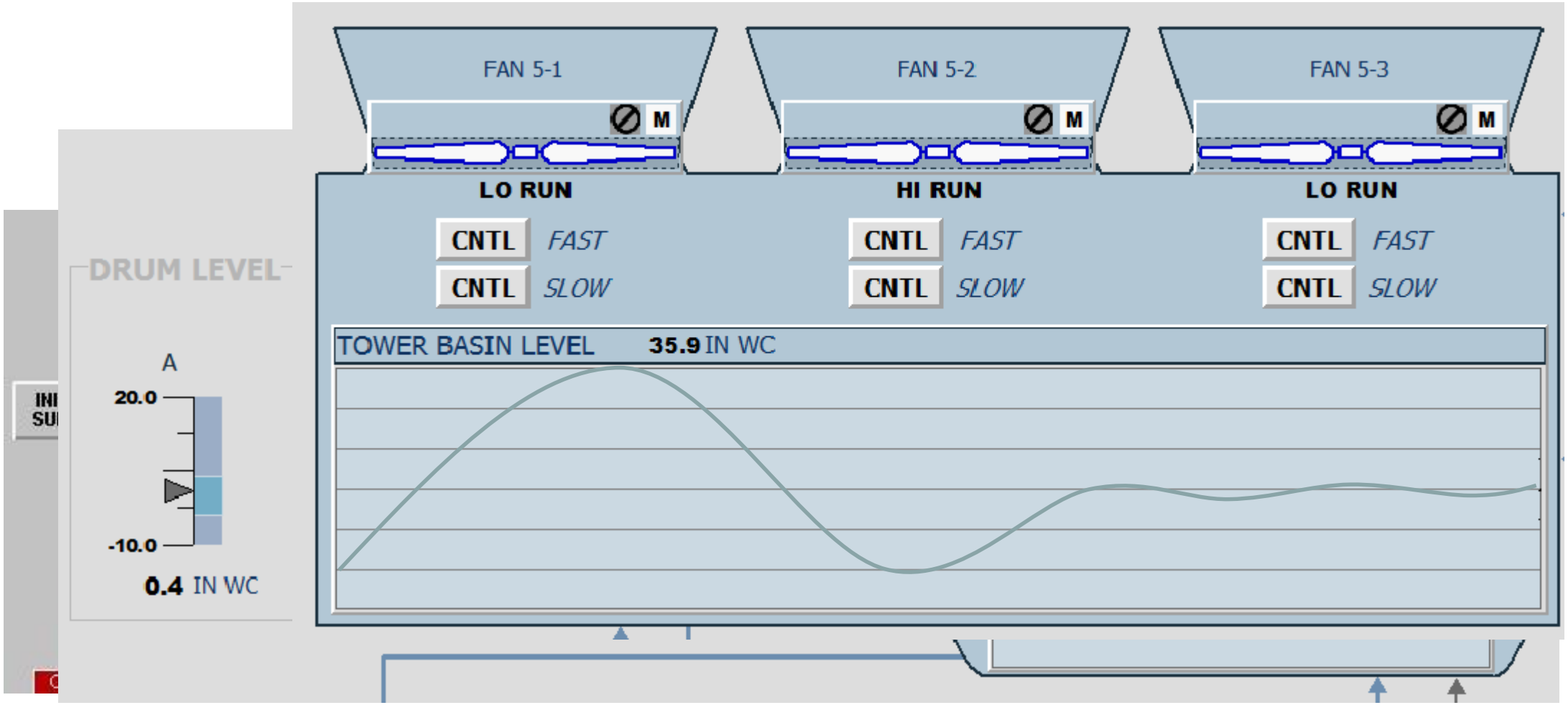
High Performance: Level example



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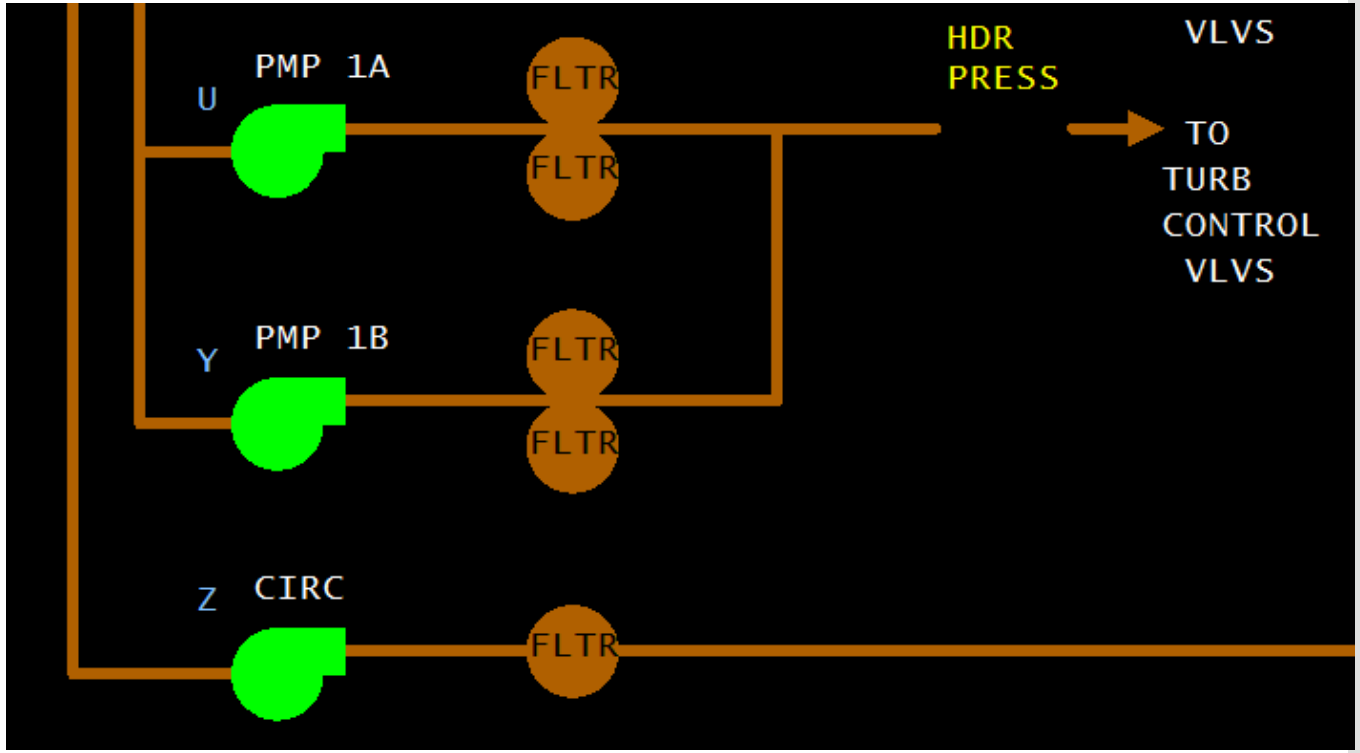
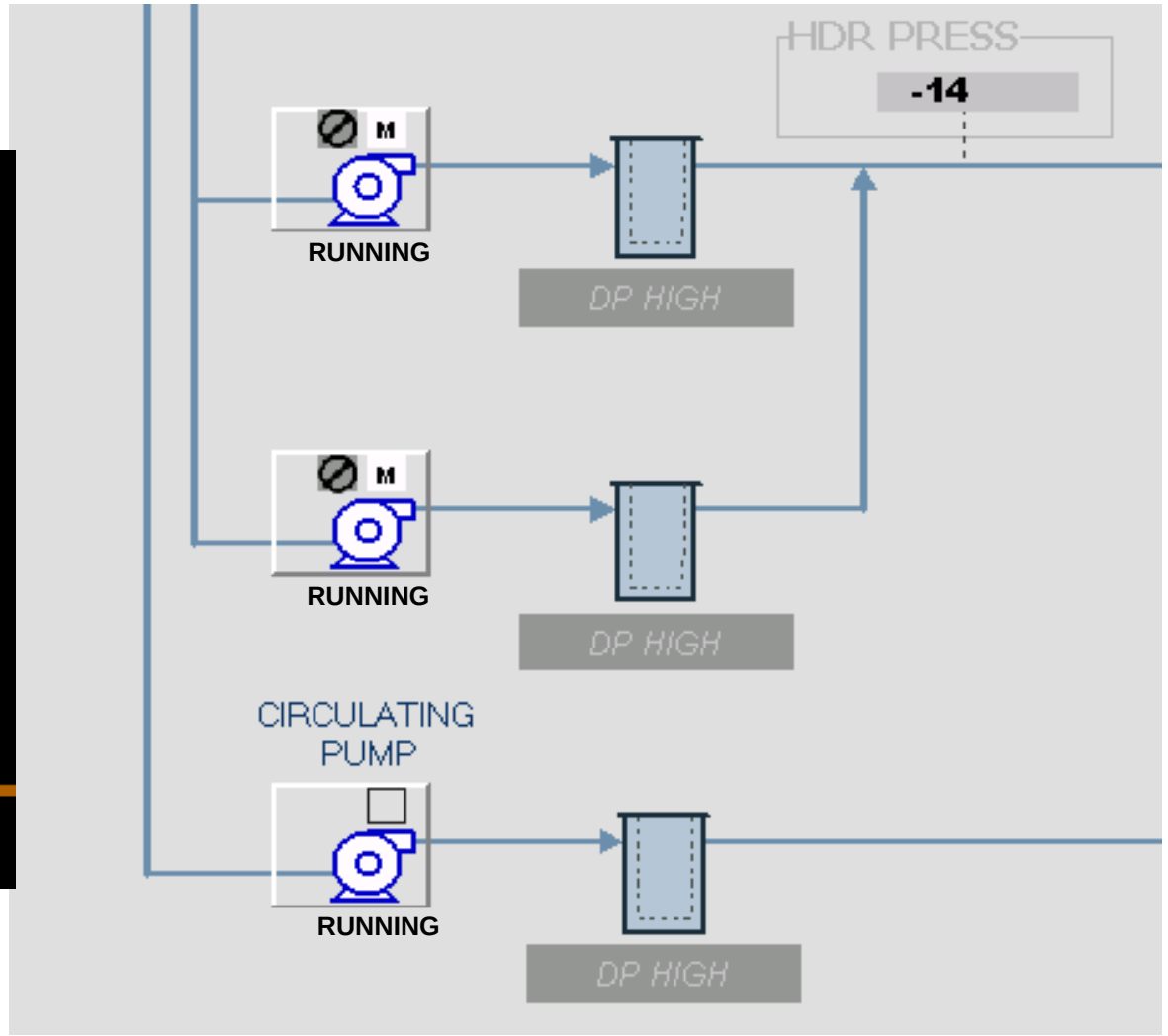
High Performance: Use of color

- Gray backgrounds are used to minimize glare and provide low contrast depiction to allow alarms to be obvious
- Bright colors are only used for alarms and abnormal situations
- Colors used for alarms are not used elsewhere

High Performance: Status indication example





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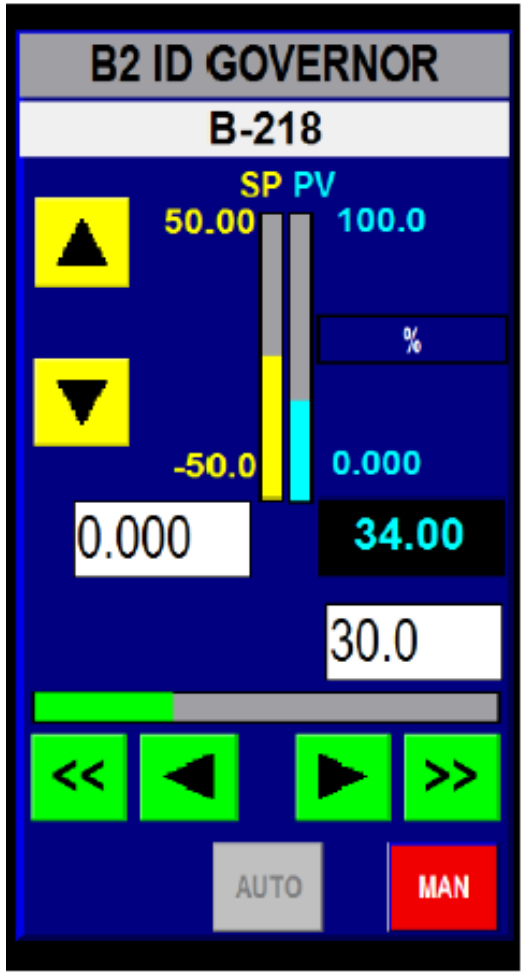
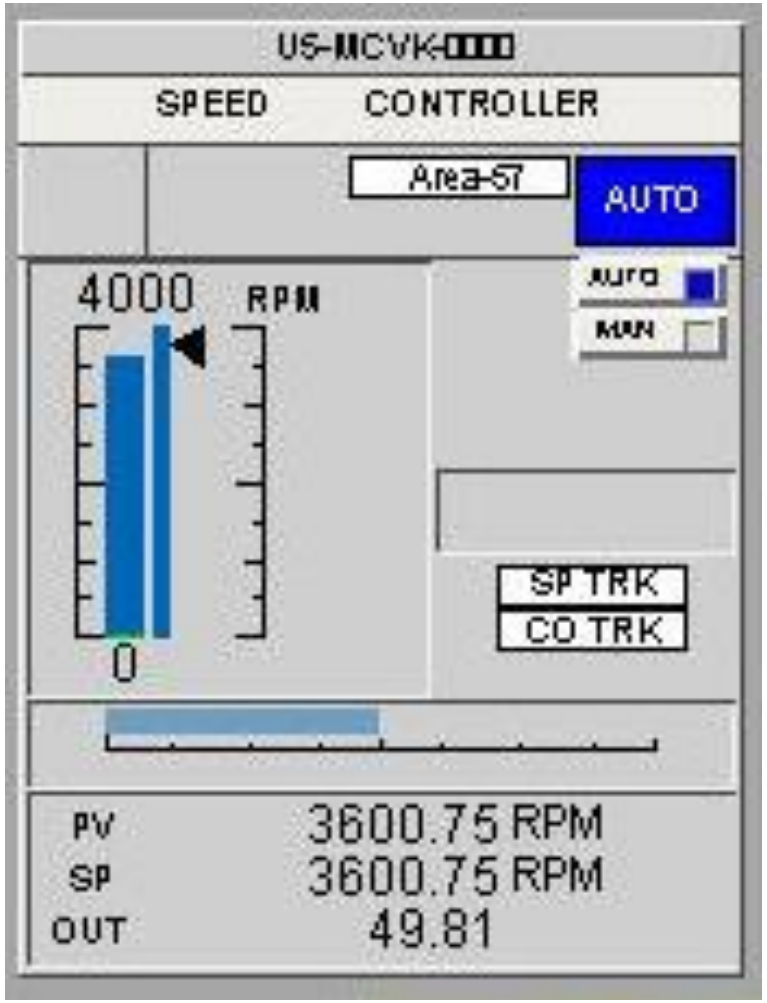
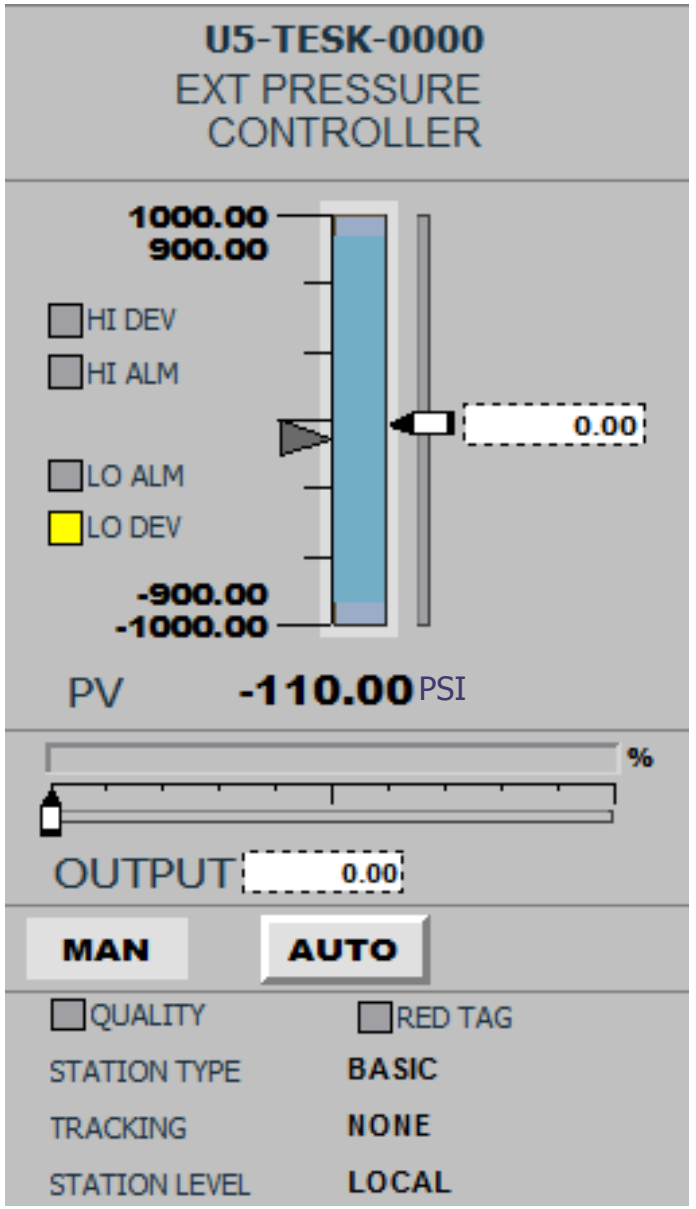
High Performance: Faceplates







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High Resolution

- Implemented on 43” - 3840 × 2160 monitors

1920 x 1080	1920 x 1080
1920 x 1080	1920 x 1080

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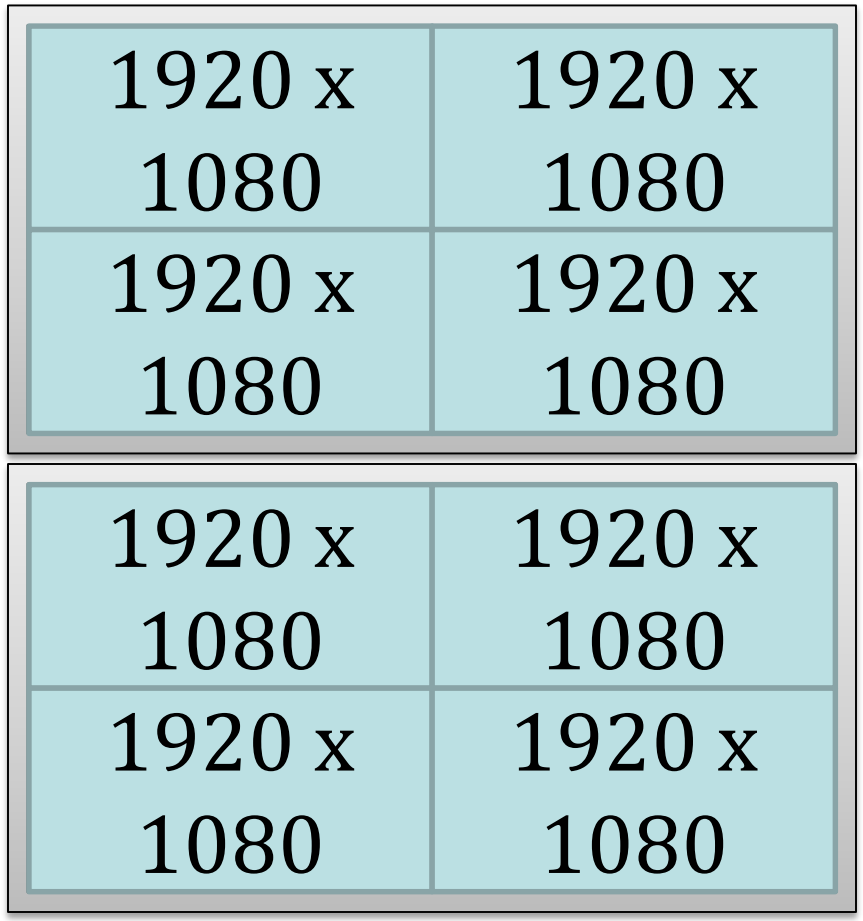
High Resolution

- Each operator will use two



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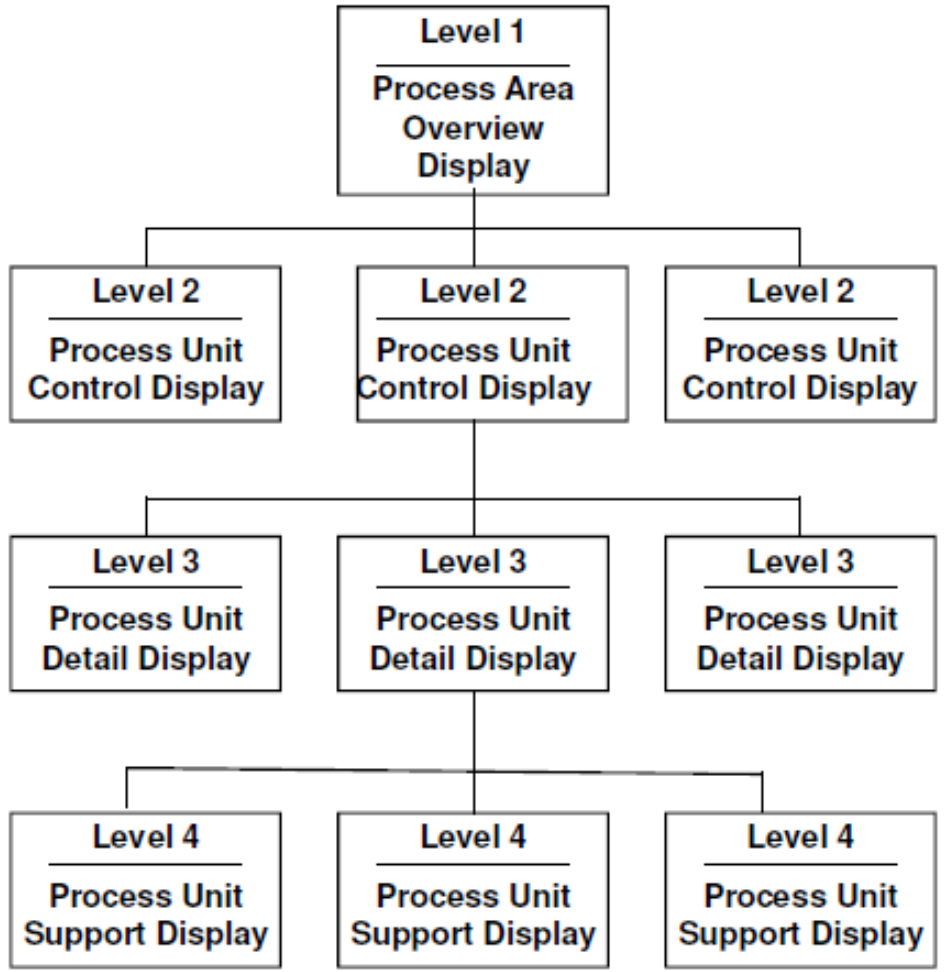
HP HMI - Hierarchy

- Level 1 – Process area overview
  - At a glance display
- Level 2 – Process Control Unit
  - Controllers, Values, Alarms, Trends, Status
- Level 3 – Process Unit Detail
  - Small equipment groups
- Level 4 – Diagnostic, Interlocks, First-Outs, Procedures, Documentation



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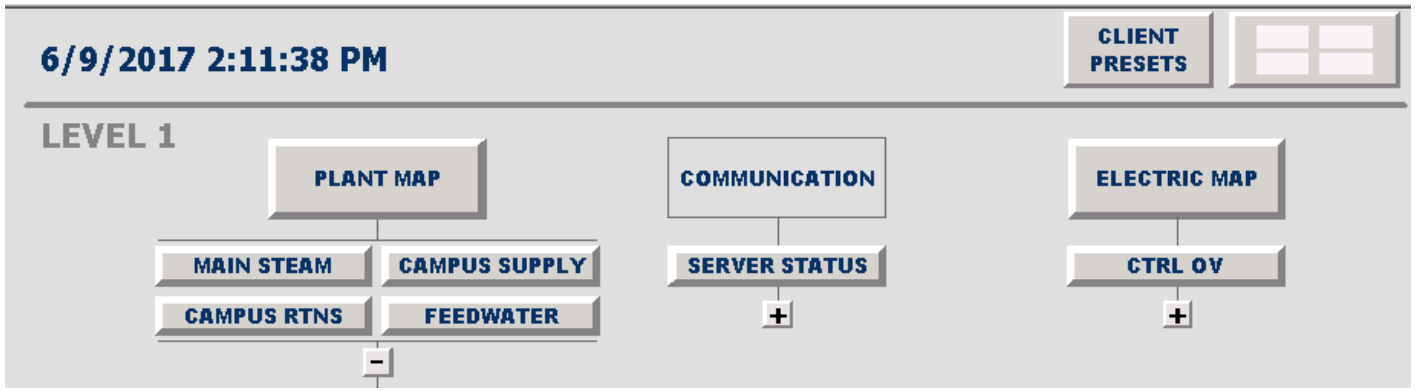

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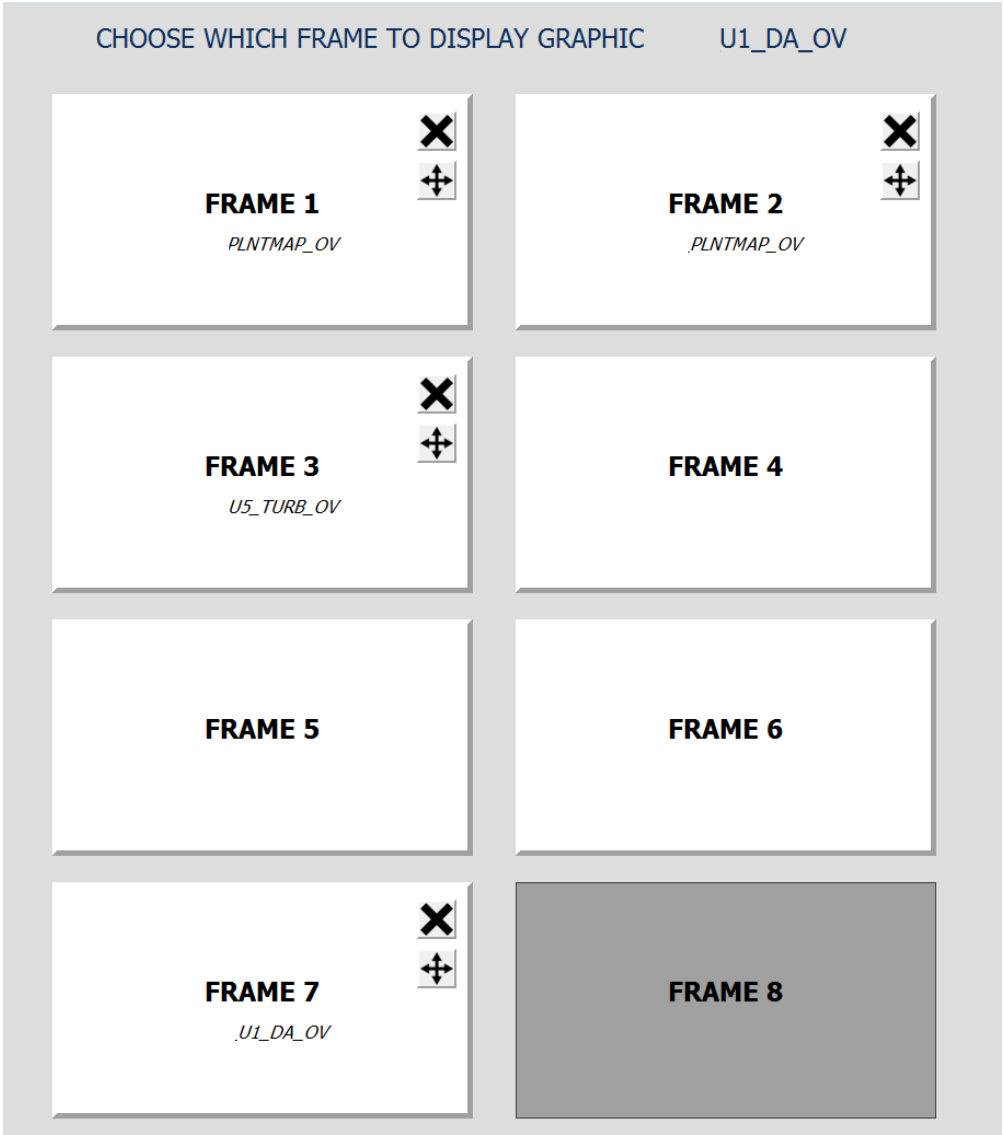
High Resolution

- Navigation:



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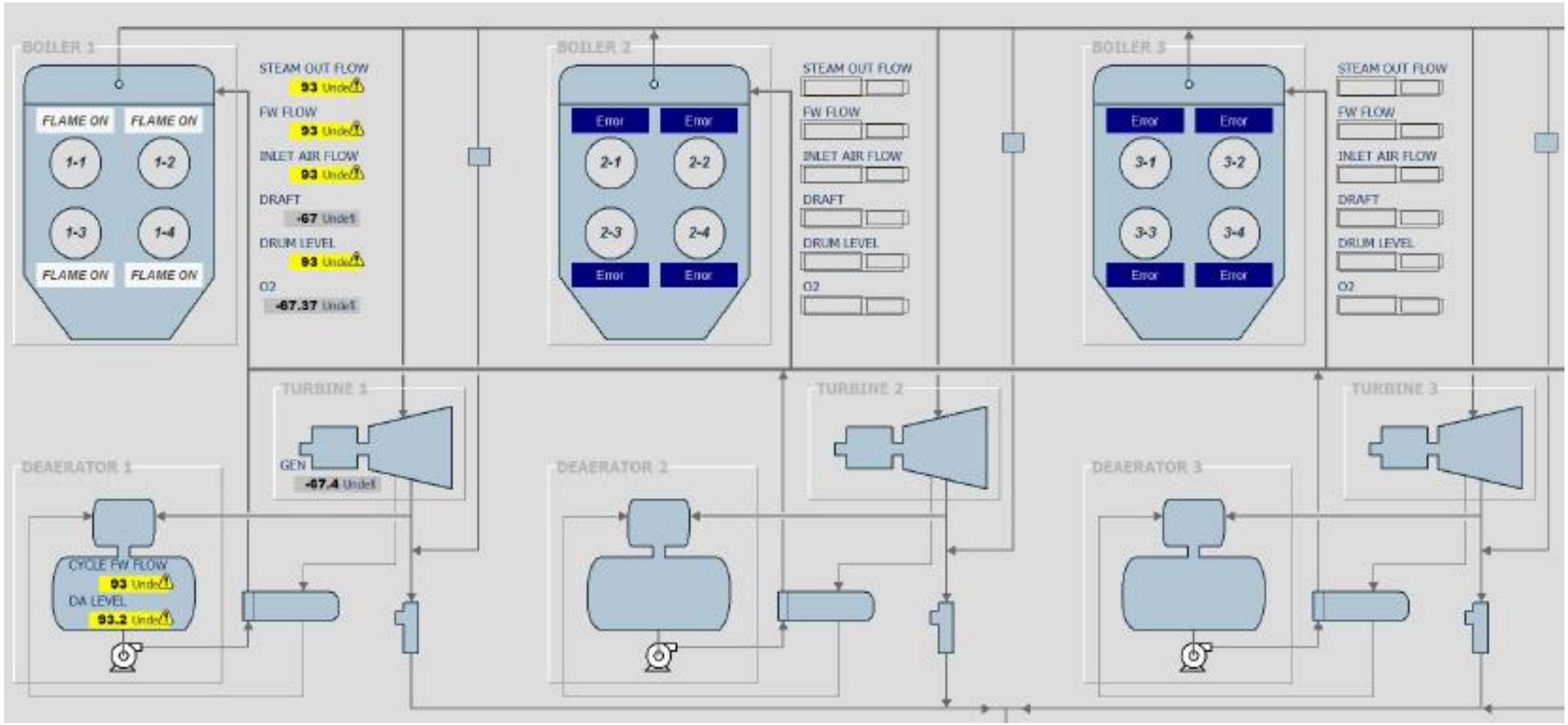
Level 1



Sunday, June 25, 2017

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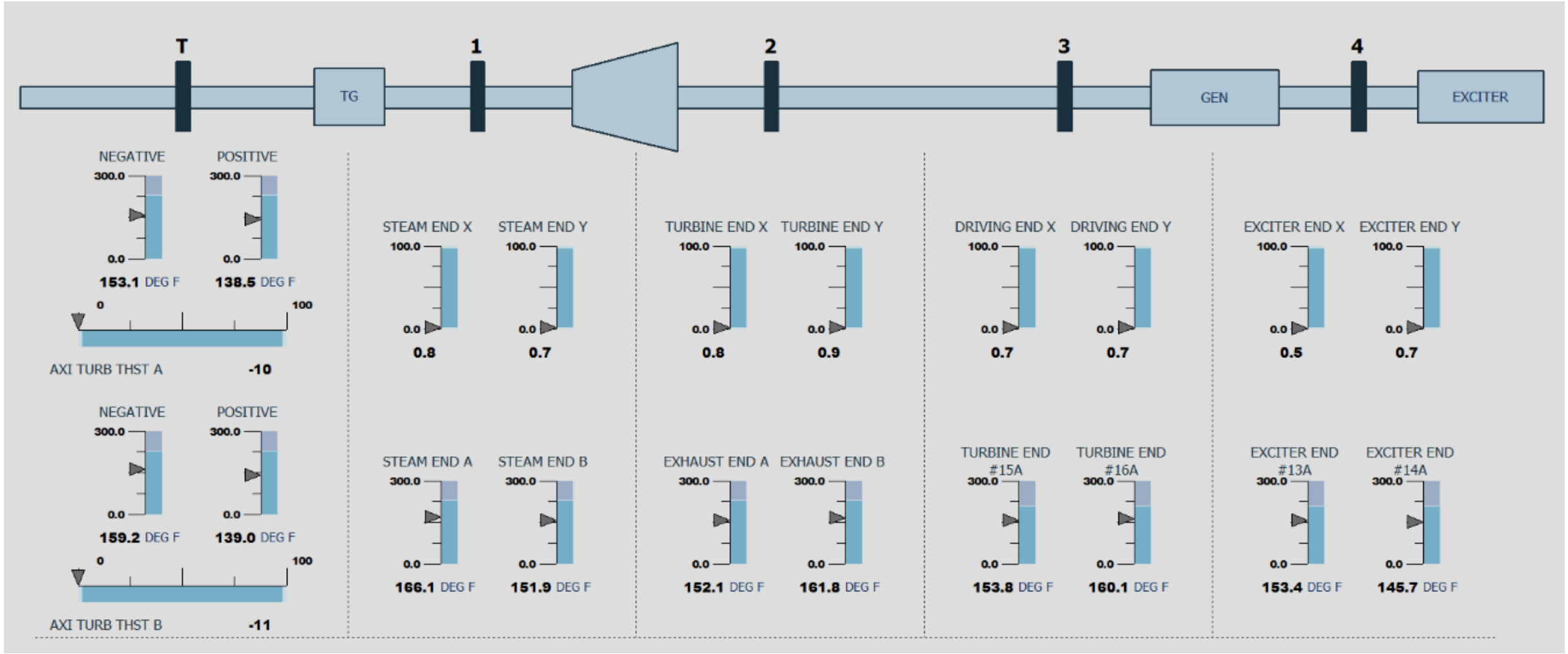
Level 2



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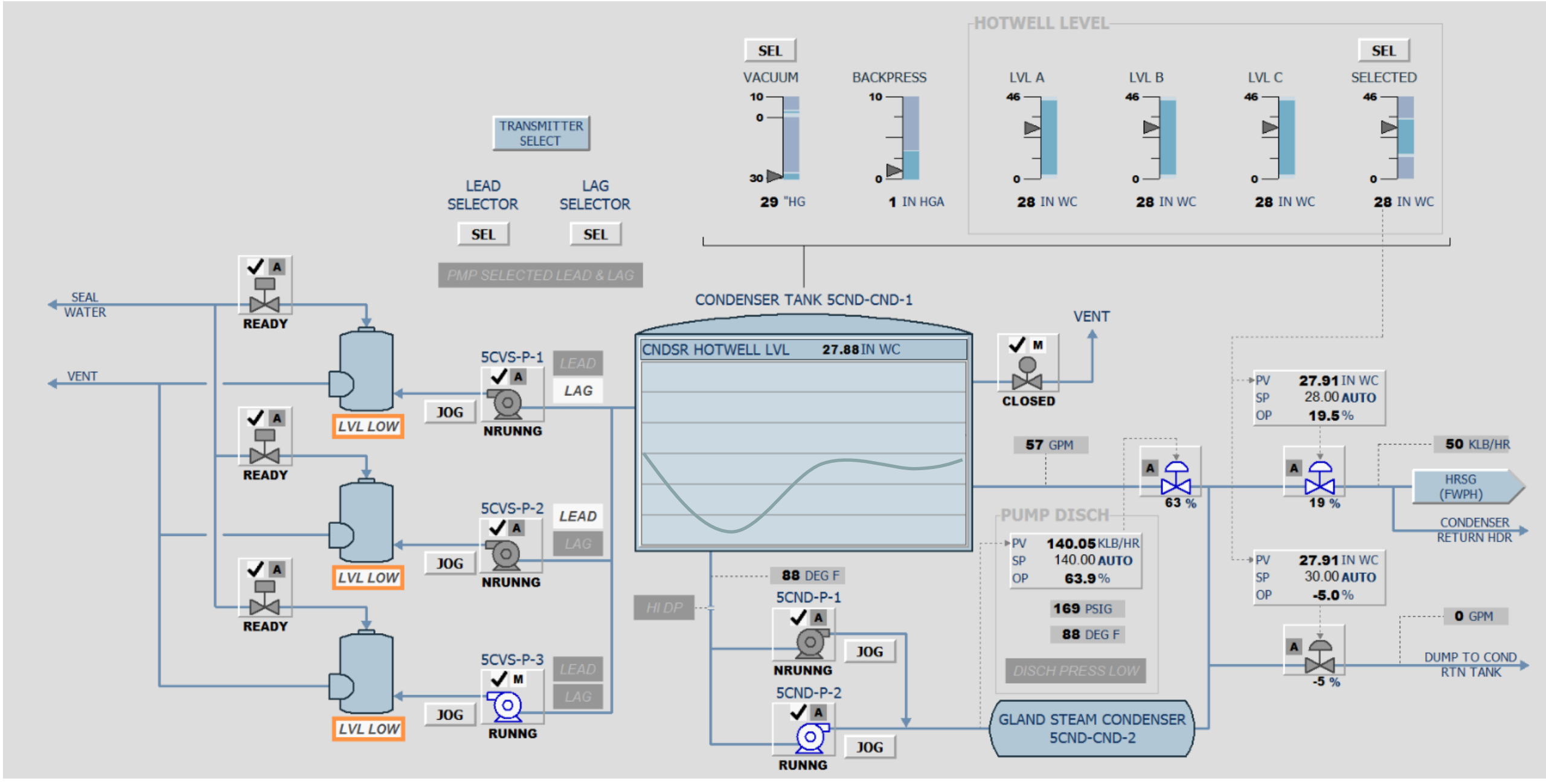
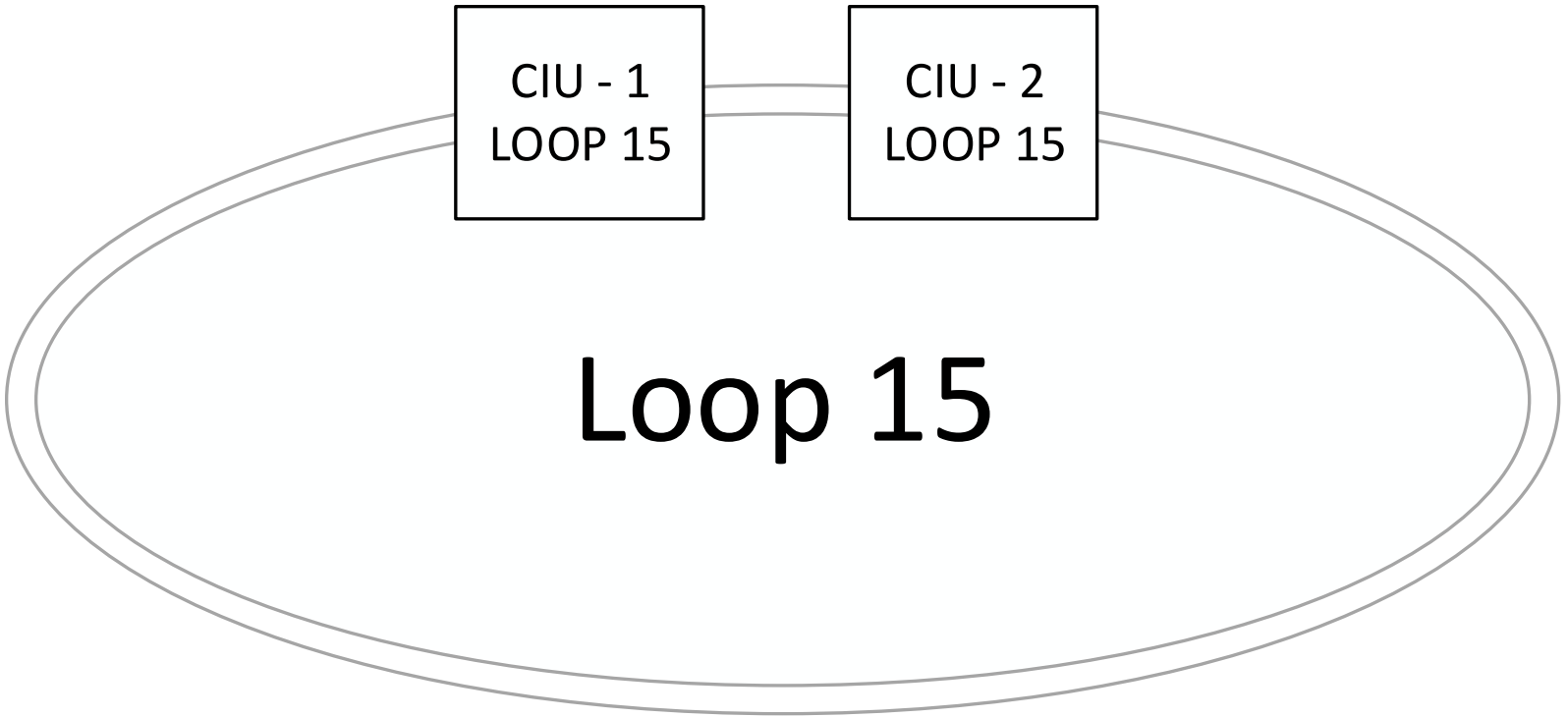
Level 3


HOTWELL LEVEL
SEL
VACUUM
BACKPRESS
LVL A
LVL B
LVL C
SELECTED
SEL
10
0
30
29 "HG
10
0
1 IN HGA
46
0
28 IN WC
28 IN WC
28 IN WC
28 IN WC
TRANSMITTER SELECT
LEAD SELECTOR
LAG SELECTOR
SEL
SEL
PMP SELECTED LEAD & LAG
CONDENSER TANK 5CND-CND-1
CNDSR HOTWELL LVL 27.88 IN WC
SEAL WATER
VENT
READY
READY
READY
READY
LVL LOW
LVL LOW
LVL LOW
LVL LOW
5CVS-P-1
5CVS-P-2
5CVS-P-3
JOG
JOG
JOG
NRUNNG
NRUNNG
RUNNG
LEAD
LAG
LEAD
LAG
LEAD
LAG
HI DP
88 DEG F
5CND-P-1
5CND-P-2
NRUNNG
RUNNG
JOG
JOG
VENT
CLOSED
57 GPM
63 %
PUMP DISCH
PV 140.05 KLB/HR
SP 140.00 AUTO
OP 63.9 %
169 PSIG
88 DEG F
DISCH PRESS LOW
GLAND STEAM CONDENSER 5CND-CND-2
PV 27.91 IN WC
SP 28.00 AUTO
OP 19.5 %
19 %
50 KLB/HR
HRSG (FWPH)
CONDENSER RETURN HDR
PV 27.91 IN WC
SP 30.00 AUTO
OP -5.0 %
-5 %
0 GPM
DUMP TO COND RTN TANK

High Availability



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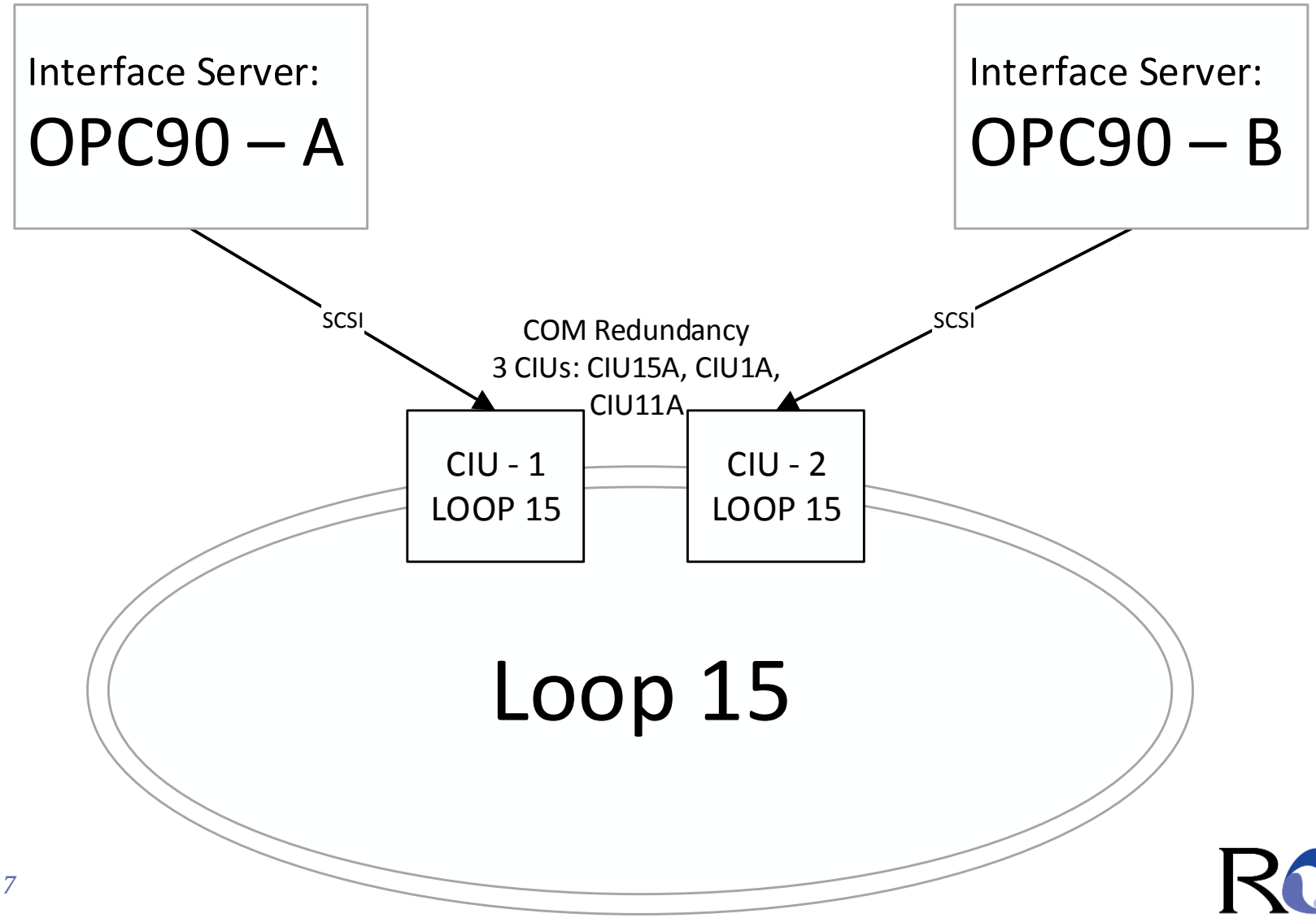
High Availability



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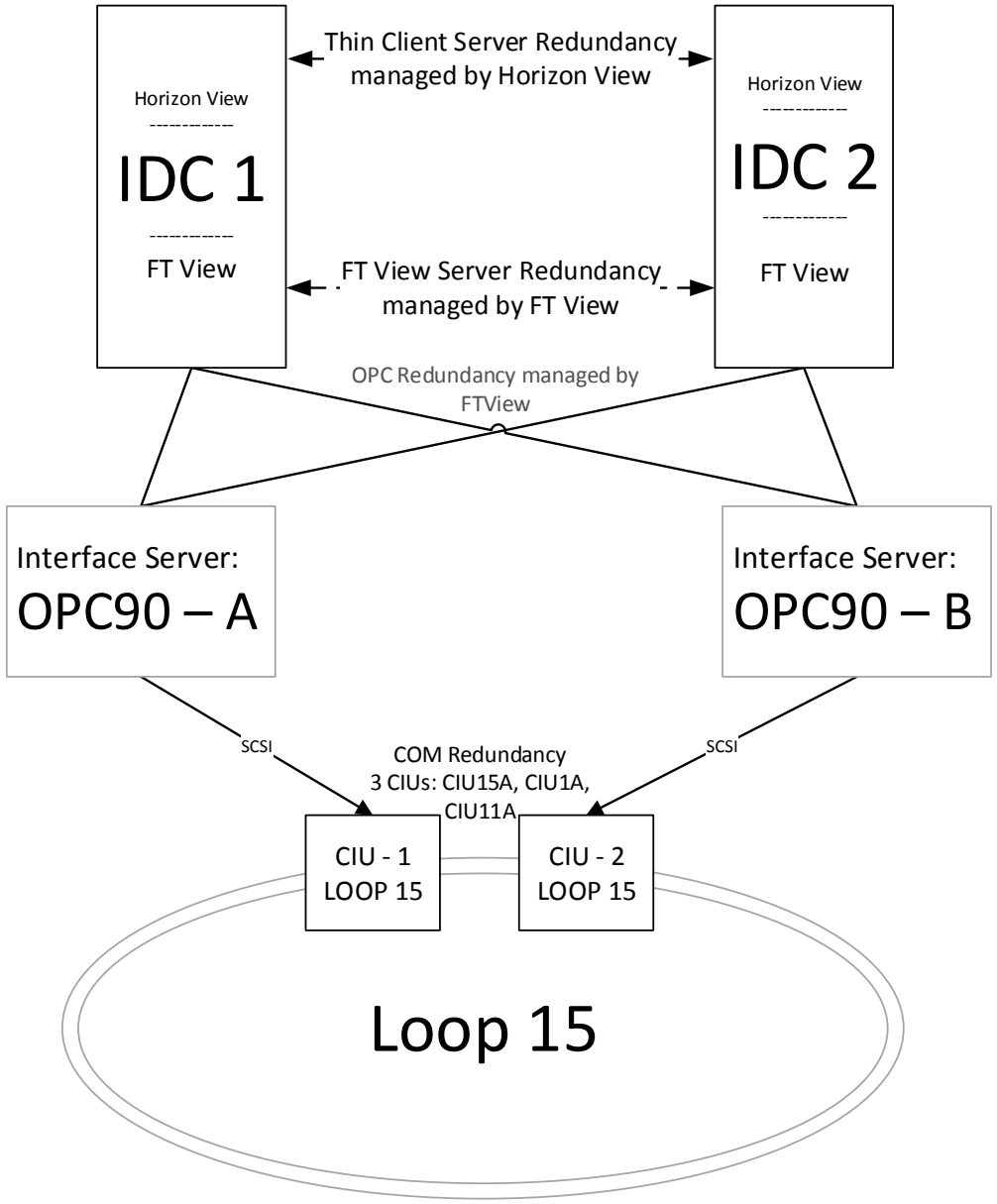
High Availability



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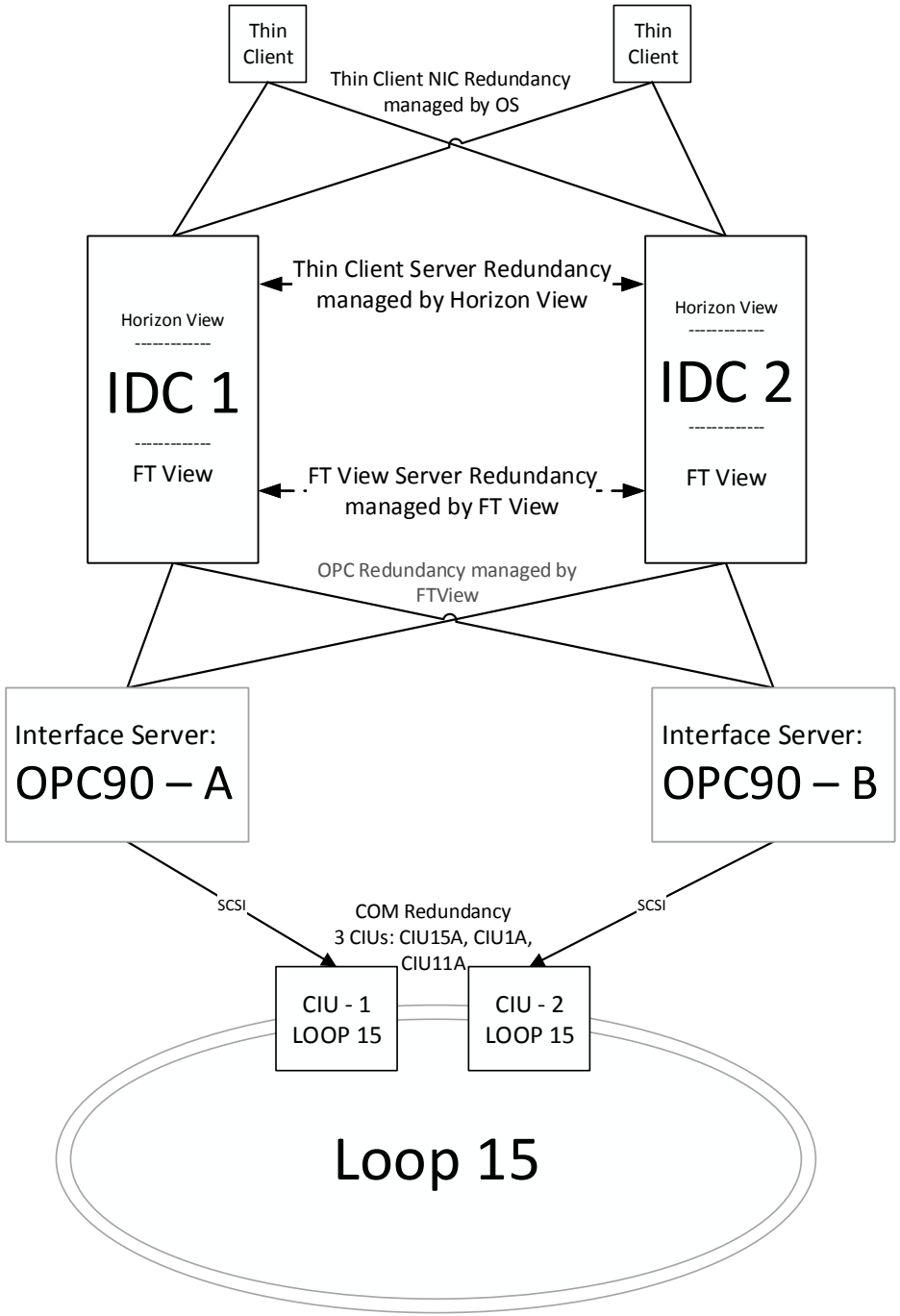

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Operator Buy-in

- Operators miss the color
- Project performed in phases
- Solicit feedback throughout and after project

Wrap-up

- High Performance
- High Resolution
- High Availability

For more information

- ANSI/ISA-101.01-2015 - Human Machine Interfaces for Process Automation Systems

Acknowledgements

- Hollifield, B. R. (2008). *The high performance HMI handbook: A comprehensive guide to designing, implementing and maintaining effective HMIs for industrial plant operations*. Houston, TX: PAS.

Thank you