UNICOS-CPC

Operation Basics

CERN EN-ICE

UNICOS-CPC Team

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Hierarchical Decomposition
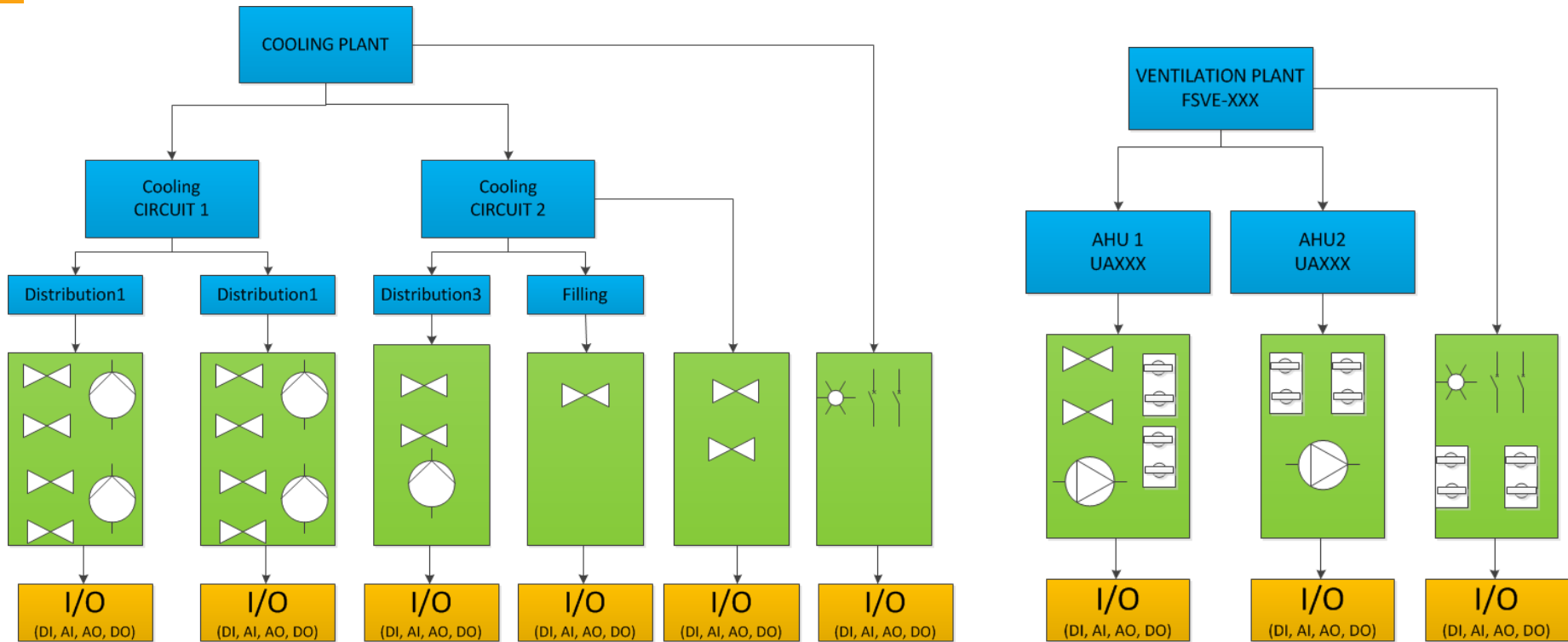
PCO (Process Control Object) ➔ Process Units

FIELD OBJECTS ➔ actuators (OnOff or Analog)

I/O OBJECTS ➔ sensors or actuator orders

**Run Orders ALWAYS
follow the hierarchy
from top to bottom**

**Operators can act at
ALL levels**

Operation modes

Auto   Manual   Forced   Local   Hardware Local   Mode Inhibit

- **Mode "Auto"**
  - ✓ PLC is driving the unit or the actuator

- **Mode "Manual"**
  - ✓ Operator is driving the unit or the actuator
  - ✓ Manual mode disappears on a start/stop request of the master unit
  - ✓ Interlocks are applied and effective

- **Mode "Forced"**
  - ✓ Operator is driving the unit or the actuator
  - ✓ Forced mode is always maintained
  - ✓ Interlocks are applied and effective

- **Mode "Local"**
  - ✓ Idem « Forced » but from a Touch Panel
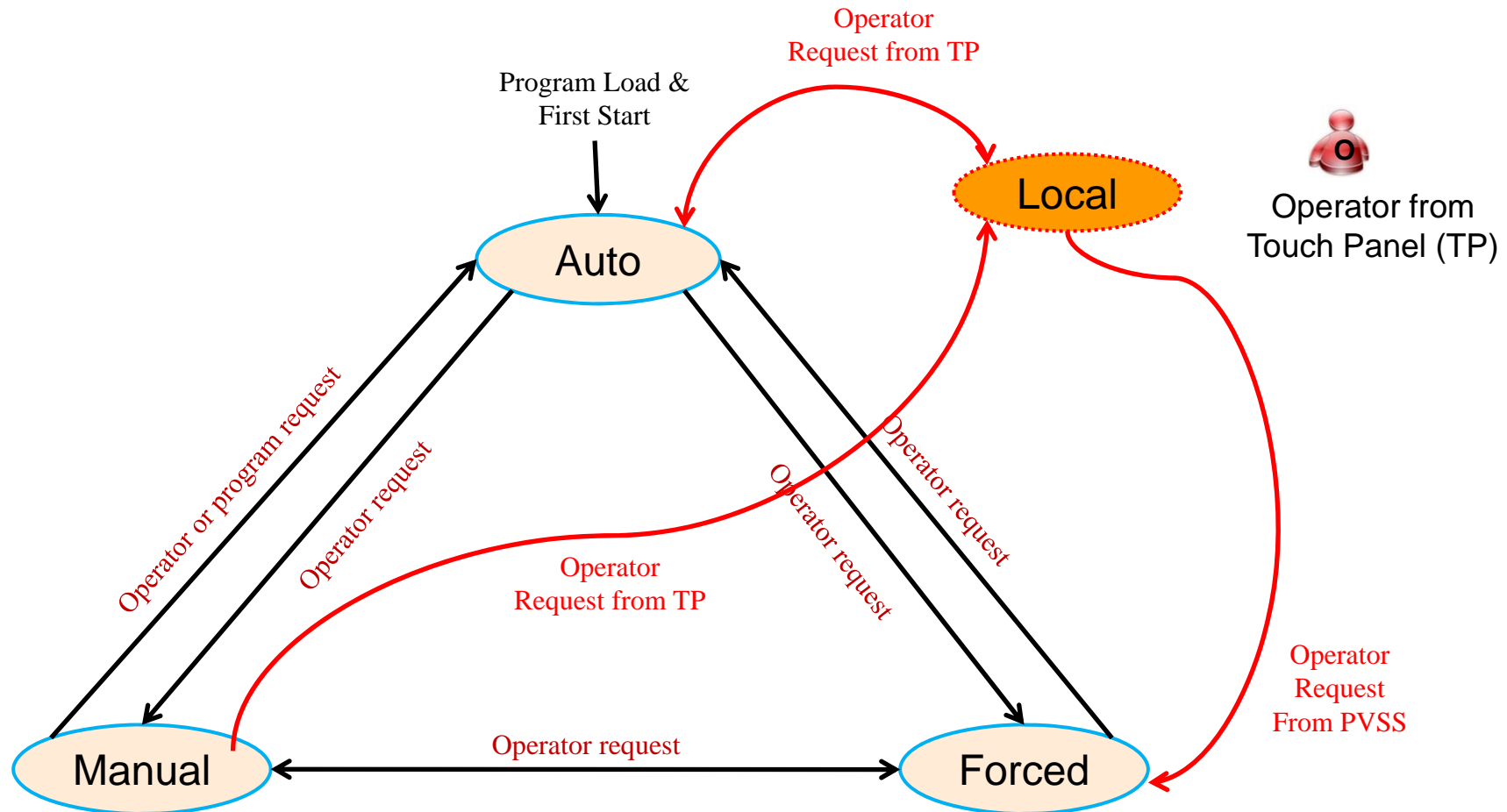
- **Mode "Hardware Local"**
  - ✓ Actuator is driven electrically without the PLC
  - ✓ Interlocks are applied but they are not effective

- **Mode inhibition**
  - ✓ Manual and Forced mode can be inhibited (forbidden)
  - ✓ Ex: used in "fire detection" mode is some installations

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Mode Transitions

**Operator
Request from TP**

**Program Load &
First Start**

Local

O

Operator from
Touch Panel (TP)

Auto

Operator or program request

Operator request

Operator request

Operator request

**Operator
Request from TP**

Operator request

**Operator
Request
From PVSS**

Manual

Operator request

Forced

Hardware Local*: Always prioritary: Set/Reset from a button on the process directly*
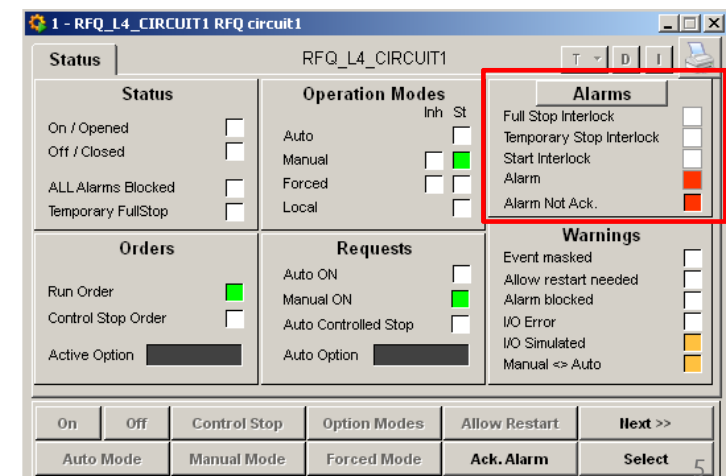
Alarms and Interlocks

- **Alarm:** Visual information indicating a potential problem (**A**)
  - ✓ No interlock on the process

- **Interlock:** Action on the process (in any operation mode)
  - ✓ Interlock on PCO: Run Order is reset
  - ✓ Interlock on actuator: Go to fail-safe position
  - ➢ **Start Interlock** (**I**):
    - Avoid the starting (stay « Off »)
  - ➢ **Temporary Stop Interlock** (**S**):
    - Go to fail-safe position while the condition is filled
    - Restart automatically if the condition is not filled anymore
    - Acknowledgement (**Ack. Alarm**) stops the blinking
  - ➢ **Full Stop Interlock** (**F**) :
    - Go to fail-safe position while the condition is filled
    - Acknowledgement (**Ack. Alarm**) stops the blinking
    - « **Allow Restart** » allows the restart if the condition is not filled anymore
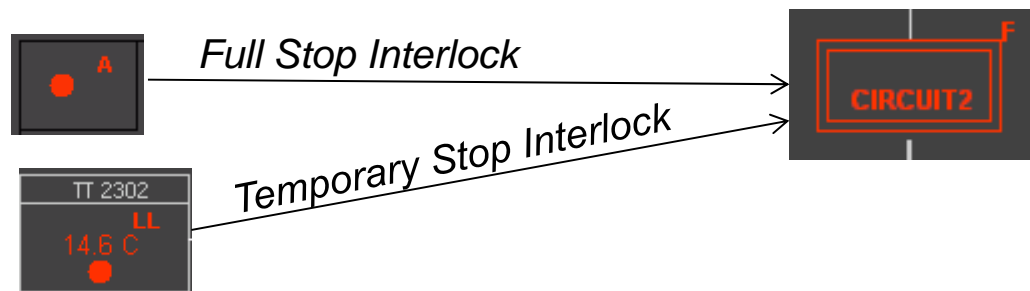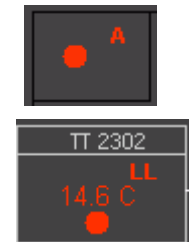
« Allow restart » needed to restart:
Orange letter **R**

Active Condition:
Letter **A**, **I**, **S** or **F**

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Alarm object and interlock

- **Interlocks are triggered by « alarm objects »**
  - ✓ **Digital alarm**: Boolean condition (**A**)
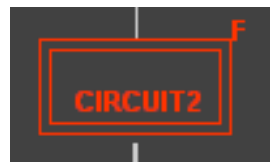 - ✓ **Analog Alarm**: Threshold detection on a sensor (**HH**, **H**, **L**, **LL**)

Full Stop Interlock

Temporary Stop Interlock

- **« Block PLC Alarm » : Block the interlock <u>in the PLC</u>**

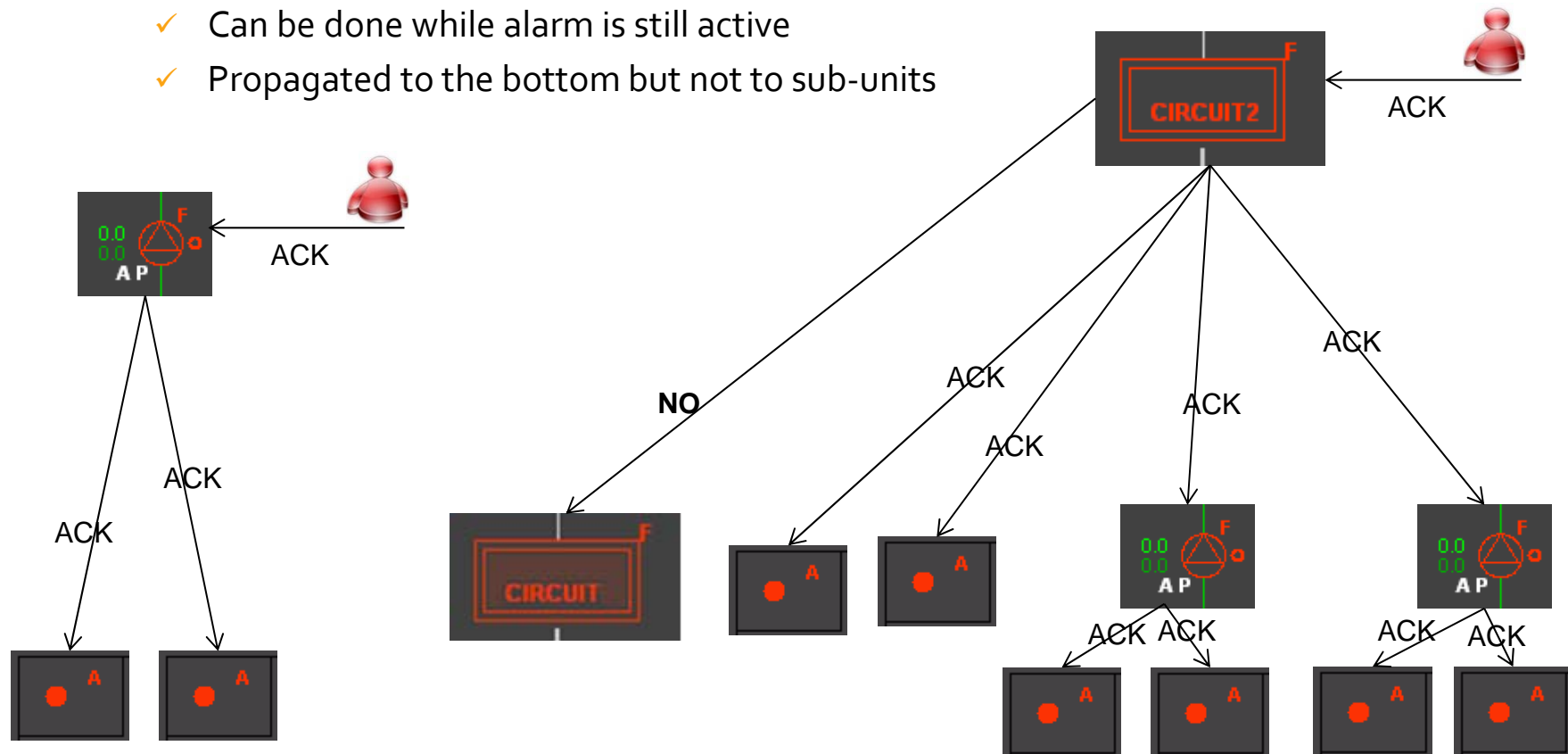*Block Interlock*

Interlock Diagnostic
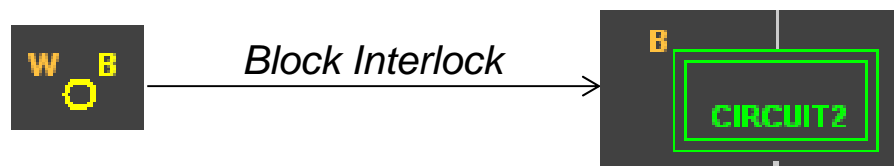
■ From synoptic:
  ✓ Double click on actuator or unit.
    ■ button « *Alarms* » from the faceplate display all possible FS, TS, SI, AL on this unit or actuator
  ✓ Other solution: right click on the widget and click on « Alarms »

Acknowledgement propagation

- Acknowledgement (alarms, units, actuators)
  - ✓ Stop the blinking
  - ✓ Can be done while alarm is still active
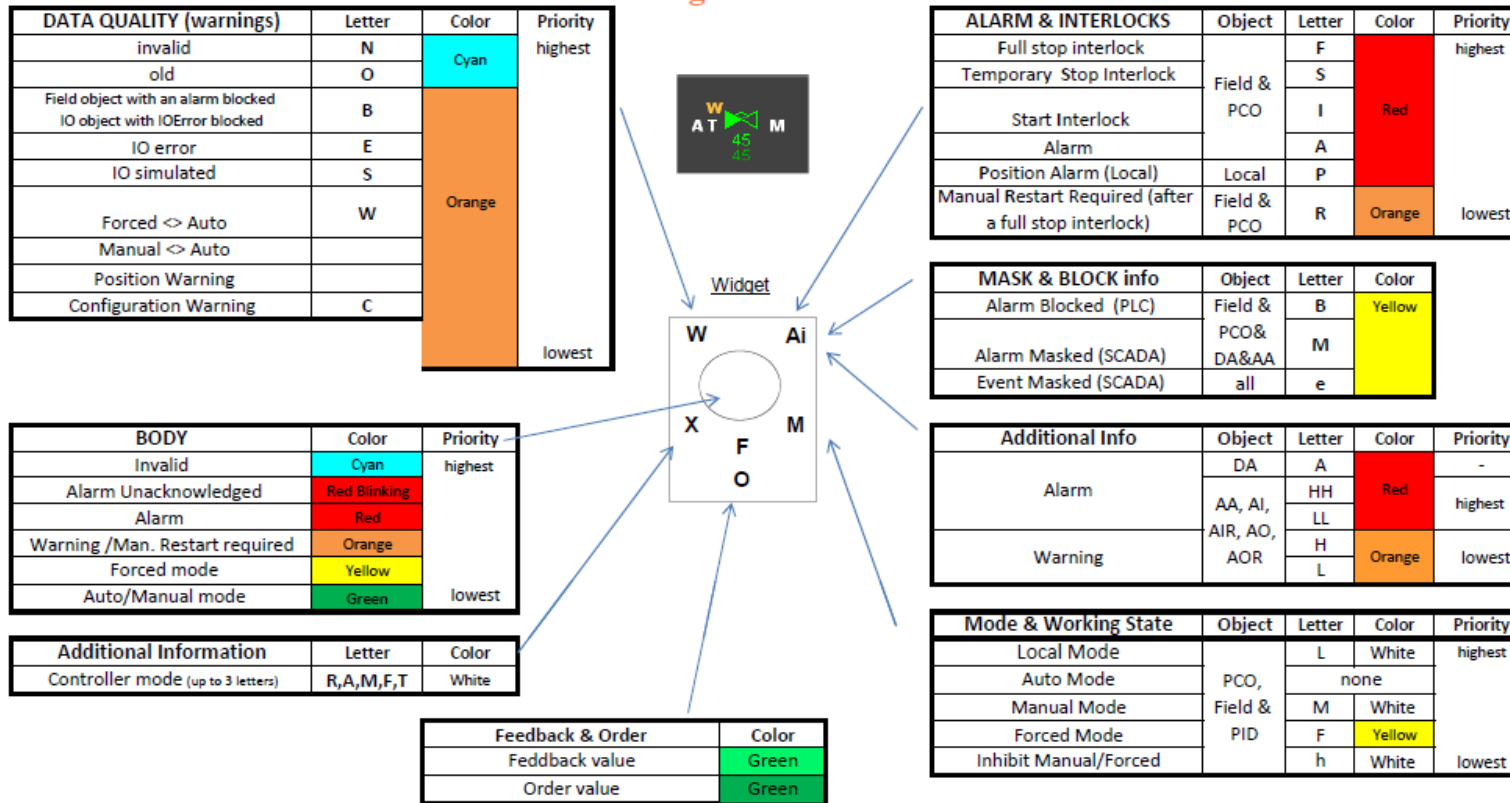 - ✓ Propagated to the bottom but not to sub-units

Allow Restart: Never propagated.

UNICOS-CPC Widgets animation

DATA QUALITY (warnings)

DATA QUALITY (warnings)	Letter	Color	Priority
invalid	N	Cyan	highest
old	O		
Field object with an alarm blocked / IO object with IOError blocked	B		
IO error	E		
IO simulated	S		
Forced <> Auto	W	Orange	
Manual <> Auto			
Position Warning			
Configuration Warning	C		lowest

BODY

BODY	Color	Priority
Invalid	Cyan	highest
Alarm Unacknowledged	Red Blinking	
Alarm	Red	
Warning /Man. Restart required	Orange	
Forced mode	Yellow	
Auto/Manual mode	Green	lowest

Additional Information

Additional Information	Letter	Color
Controller mode (up to 3 letters)	R,A,M,F,T	White

Feedback & Order

Feedback & Order	Color
Feddback value	Green
Order value	Green

Widget

W Ai
X M
F
O

ALARM & INTERLOCKS

ALARM & INTERLOCKS	Object	Letter	Color	Priority
Full stop interlock	Field & PCO	F	Red	highest
Temporary Stop Interlock		S		
Start Interlock		I		
Alarm		A		
Position Alarm (Local)	Local	P		
Manual Restart Required (after a full stop interlock)	Field & PCO	R	Orange	lowest

MASK & BLOCK info

MASK & BLOCK info	Object	Letter	Color
Alarm Blocked (PLC)	Field & PCO& DA&AA	B	Yellow
Alarm Masked (SCADA)		M	
Event Masked (SCADA)	all	e	

Additional Info

Additional Info	Object	Letter	Color	Priority
Alarm	DA	A	Red	-
	AA, AI, AIR, AO, AOR	HH		highest
		LL		
Warning		H	Orange	lowest
		L		

Mode & Working State

Mode & Working State	Object	Letter	Color	Priority
Local Mode		L	White	highest
Auto Mode	PCO, Field & PID	none		
Manual Mode		M	White	
Forced Mode		F	Yellow	
Inhibit Manual/Forced		h	White	lowest

Analog	AI,AS	Analog	Analog	Analog	OnOff	AI,AS	PID	Analog	OnOff	OnOff	DA	AA	AA
Data Invalid	No refresh Data	Data not connected	Forced Mode	Auto Regulated & order: 17.1 stat: 16.3	Warning & Forced Mode	Forced Mode & Event Masked	Manual & Regulation & Simulated	Inhibit Manual mode activate	Temporary Stop Interlock	Start Interlock active	Alarm On	Blocked alarm	Warning High