

Analog Output Signal



Introduction

Yokogawa's pressure transmitters with BRAIN or HART communication have a 4 to 20 mA analog signal corresponding to the Primary Variable (PV). This output signal is generated from the digital signal supplied by the DPHarp sensor using a 15BitD/A signal converter with 0.004% resolution. The transmitters are designed to drive output slightly greater than the 4 to 20 mA "Base" signal. The intention is to set analog alarm thresholds recognizably beyond the normal operating 4 to 20 mA range, to indicate measurement out of range, and to set further alarm thresholds to indicate a fault condition.

Applicable Models

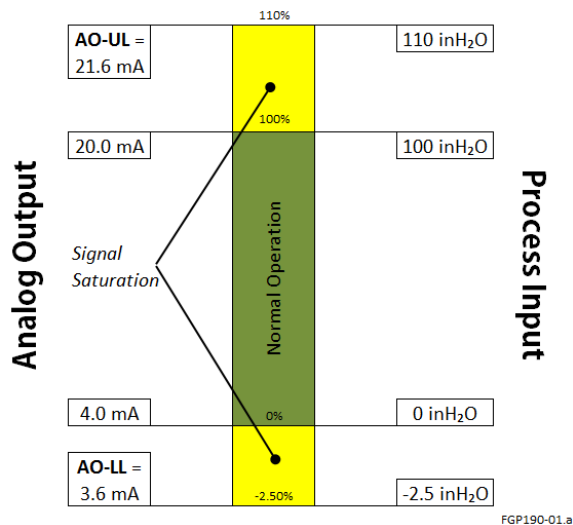
- > **EJA-E Series:** All models with either BRAIN or HART communication
- > **EJX-A Series:** All models with either BRAIN or HART communication

Process Measurement Out-of-Range

Standard Analog Output Signal

Yokogawa's standard analog output transmitters are factory set to an Analog Output— Lower Limit (AO-LL) and Analog Output-Upper Limit (AO-UL) of 3.6 mA and 21.6 mA respectively. This allows for a small amount of linear over-range process readings. This over-range signal is referred to as *Signal Saturation*. During operation, if the AO-LL or AO-UL limits are reached, the analog signal locks to the respective limit. This locked value indicates an "out-of-range" event of the PV to the controller.

Example: Transmitter ranged 0 to 100 in H₂O



If the process input exceeds 110 inH₂O, the analog output holds at 21.6 mA. If the process input exceeds -2.5 inH₂O, the analog output holds at 3.6 mA. Holding at these values warns the control unit of an "out-of-range" event.

The Signal Saturation can be controlled by setting the respective AO-LL and the AO-UL. The AO-LL and the AO-UL are programmable within the parameter limits of the transmitter via the FieldMate.



```

DTM Works
  v
Menu
  v
Device Configuration
  > Detailed Setup
    > Output Condition
      > Analog Output
        Auto Recover      On
        AO lower limit   3.60 mA
        AO upper limit   21.60 mA
    
```

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The AO-LL and the AO-UL can be set to any value between 3.6 mA to 21.6 mA.

Although FieldMate is highlighted here, any Hart Communicator has access to these functions. Refer to the User's Manual for the HART menu tree. This function is available in HART 5 or HART 7.

Although FieldMate is highlighted here, the BT200 Communicator has access to these functions. Refer to the User's Manual for the BRAIN Protocol Menus.

NAMUR NE43 Analog Output Signal

NAMUR NE43 is a standard used to define the operating AO-LL and AO-UL values. Similar to the Standard Analog Output Signal, NAMUR NE43 compliant transmitters are designed to output signals greater than the 4 to 20 mA "Base" signal, allowing for a small amount of Signal Saturation. To be compliant to NAMUR NE43, the transmitters are set in the factory to have a AO-LL and AO-UL of 3.8 mA and 20.5 mA respectively. These values are set and can not be changed.

Auto Recover

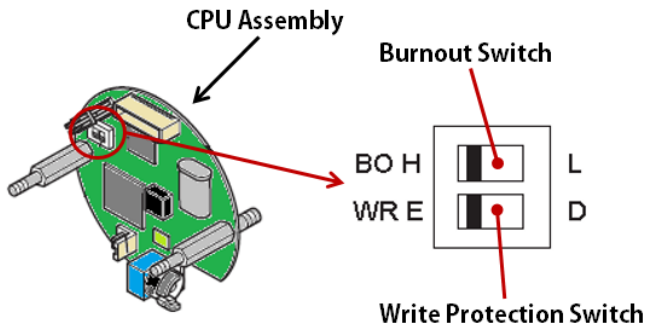
The Yokogawa transmitters are designed to recover after the process measurement returns within the spanned range of the transmitter. This is referred to as Auto Recover.

However, some customers do not want the transmitter to recover automatically. They prefer to have a technician actually go out to the transmitter; therefore the Auto Recover feature can be turned off using FieldMate. If the Auto Recover is disabled, the technician will need to cycle the power to reset the transmitter.

See above.

Hardware Fault Condition

The analog output also has values designed to indicate a self diagnosed hardware failure. Once a failure is determined, the analog output holds at ≤ 3.2 mA (Down-scale Burnout) or ≥ 21.6 mA (Up-scale Burnout). The two values are selectable via a slide switch on the amplifier board.



Factory Settings

There are several different codes available for the set-up of the analog output signal at the factory.

	Process		Hardware		Auto Recover
	AO-LL	AO-UL	BO	Value	
No Option Code	Standard		Up Scale	≥ 21.6 mA	On
	3.6 mA	21.6 mA			
/C1	Standard		Down Scale	≤ 3.2 mA	On
	3.6 mA	21.6 mA			
/C2	NAMUR NE43		Down Scale	≤ 3.2 mA	On
	3.8 mA	20.5 mA			
/C3	NAMUR NE43		Up Scale	≥ 21.6 mA	On
	3.8 mA	20.5 mA			

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Burnout Switch (BO)		
Burnout Switch (BO) position	H L E D	H L E D
Burnout	Low (3.2 mA)	High (21.6 mA)

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Refer to the exploded view of the transmitter in the User's Manual (IM) for the location of the CPU assembly board within the transmitter.

Example

Transmitter set to measure 0 to 100 inH₂O

