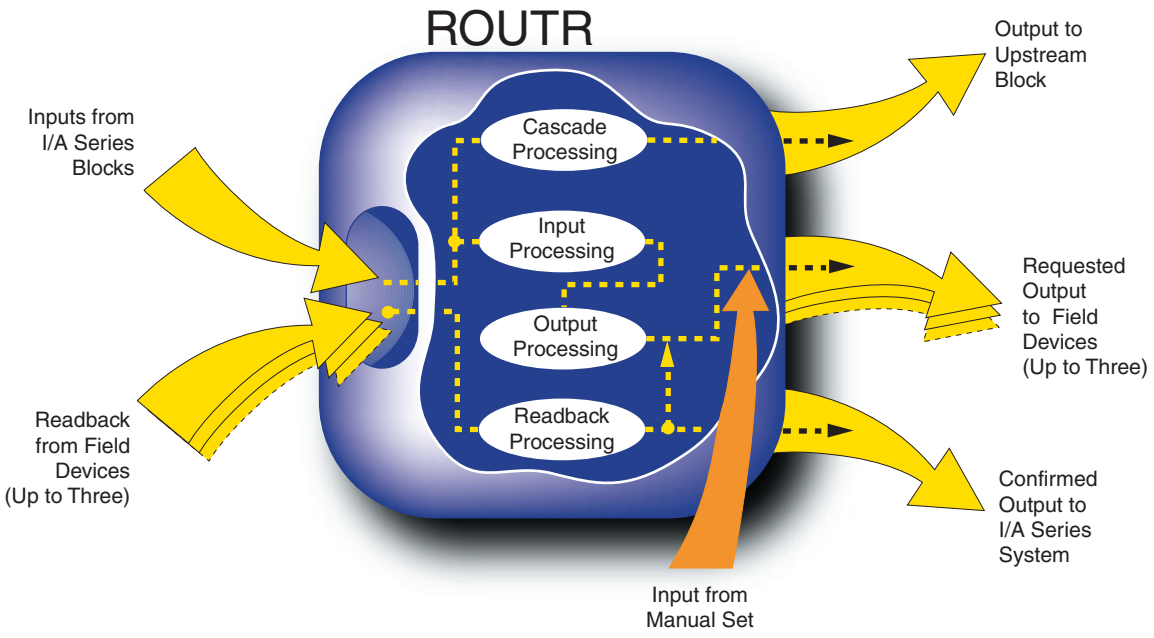
I/A Series® Software

PSS 21S-3N14 B4

Redundant Real Output (ROUTR) Block



The Redundant Real Output (ROUTR) block provides the control strategy with output capability for a single real value point directed to up to three external field devices.

FEATURES

Key features of the ROUTR block are:

- Capability to send a real output to up to three external field devices
- Separate sources for inputs in Auto and Manual modes
- Manual/Auto control of the block output signal
- Outputs written to devices on a change-driven basis, with the option to add periodic outputs
- Displayable output values for request and readback values to aid in diagnostic testing
- Inverse signal conditioning applied to limited or clamped output value
- Option to reverse the control action
- Fail-safe output option
- Change timer assuring closed loop operation in both directions
- Specific point reserved for tracking notification from external field device
- Selected readback value is scaled and conditioned to generate the confirmed output
- Open cascade notification to upstream blocks

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OVERVIEW

The ROUTR block (Figure 1) receives a real value from an upstream control strategy and sends the value to specific addresses in up to three field devices. The real output value is clamped or limited, and converted into engineering units before being sent to the redundant outputs. Two devices provide output redundancy, whereas three devices provide triple modular redundancy (TMR).

The block also confirms any change made by the Fieldbus Module (FBM) to the value in the field device by reading back the value from the FBM and storing it in an output parameter. An arbitration algorithm determines which one of the two or three readback values to use. The readback function allows changes to be made to the point value at either end of the block while providing closed loop operation in both directions.

The ROUTR block can optionally be configured to:

- Run in the simulation mode using the measurement input in the Auto mode and the requested output in the Manual mode
- Clamp the measurement input between the low and high output limits
- Update the block output when the output timer expires
- Reverse the control action of the requested output
- Connect to one or two ECBs for dual modular redundancy (DMR), and connect to one or three ECBs for TMR

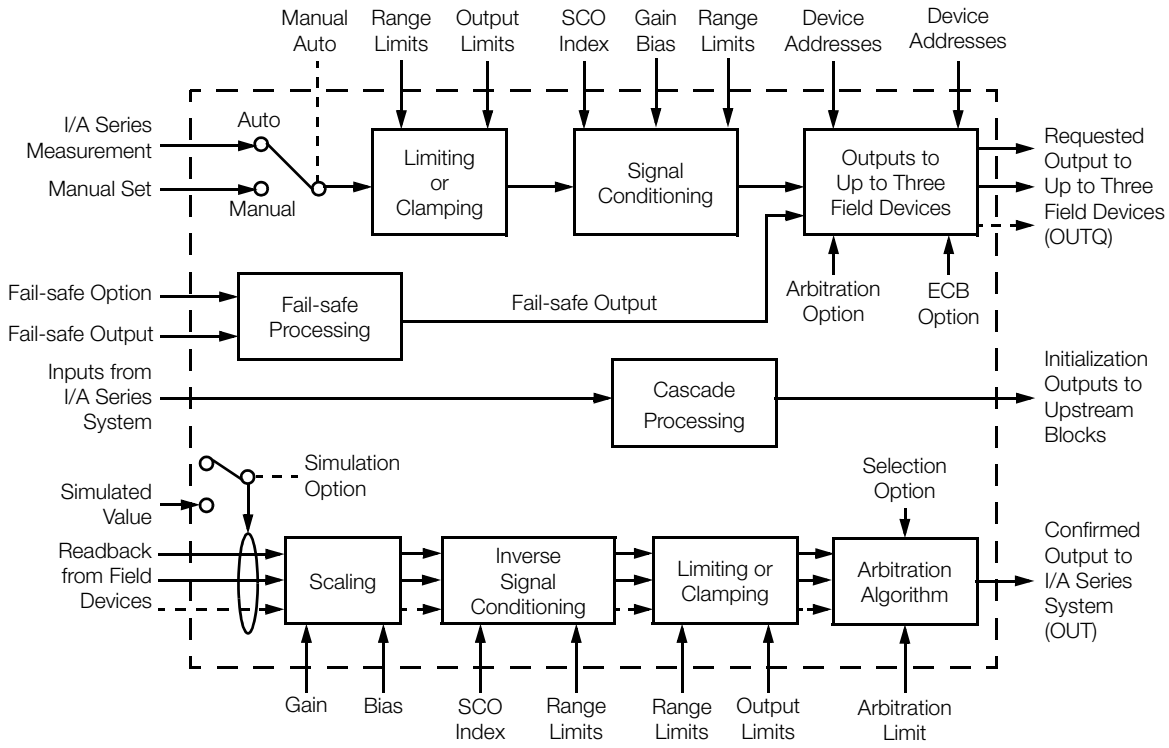

Figure 1. ROUTR Block Functional Diagram

- Send a fail-safe output value to the field devices when the conditions for fail-safe occur
- Force the block output to the readback value when the change timer expires before a requested output change is confirmed by the readback value
- Transition from Automatic to Manual control, or the opposite action, by an operator, a host process, or another block
- Notify upstream blocks in the event of an open cascade
- Propagate errors, causing abnormal conditions of the block input from the control strategy to result in an error status of the ROUTR block output.

BLOCK OPERATION

In Auto mode, ROUTR accepts a real input from an upstream control strategy at the measurement input. In Manual, it accepts a real value from an operator, generally from an I/A Series® FoxView™ display. The input value is first limited by the configured engineering range limits or clamped by the output limits, and then converted to device raw count by inverse signal conditioning based on the parameter Signal Conditioning Output (SCO) index, gain, and bias. The resultant value is sent to the specified device point addresses.

Output from ROUTR is change driven; the block only writes to the device when a change occurs in the value of the input. However, the ROUTR block offers an output timer, which, when configured, allows outputs to be written when no change-driven output has occurred for a specified number of seconds.

The value sent to the field devices is written to the requested output (OUTQ) parameter and the value read back from the FBM(s) is reflected in the confirmed output (OUT) parameter. OUT represents the value that has reached and been accepted by the field devices.

Readback values from the external devices are first scaled into the I/A Series system normalized raw count range. The resulting I/A Series system normalized raw count is then converted into engineering units by a proportionality calculation. Finally, it is limited to fall within the range specified by the high and low scale parameters or clamped by the output limits.

A change timer mechanism is used to keep the I/A Series system synchronized with the device. If the value of the output request (OUTQ) is not accepted by a device within the configured time, the confirmed output (OUT) value is compared against the value of OUTQ. If the two values differ by more than 0.05 percent of the output range, the block does not send its output value to the devices, and the value of OUT, after conversion to device raw count, is set in the output request to the devices.

ROUTR provides a back calculated output to upstream blocks to aid in cascade handling, and to alert upstream blocks to any abnormal situation.

If so desired, the ROUTR block can force an I/A Series control station to track the state of the field device during device initialization.

The ROUTR block can run in simulation mode, which allows you to test your control scheme without I/O hardware connections. In this mode, the block output is automatically written to all FBM readback parameters, simulating actual values read back from FBMs.

For a CP270 with I/A Series v8.4 or later system software, the ROUTR block provides alarming upon detection of a fault in the operational status of the Fieldbus Module or input channel.

PRINCIPAL PARAMETERS

Inputs

- Real input, derived from control strategy in Auto mode, or set by operator in Manual mode (Real)
- Manual/Auto control mode switching (Boolean)
- Primary, secondary, and tertiary external device point names (String)
- Primary, secondary, and tertiary ECB names (String)
- Low and high scale output range limits (Real)
- Low and high output limits (Real)
- Output clamp option (Short Integer)
- Output gain and bias values (Real)
- Arbitration and redundant ECB options (Boolean)
- Fail-safe option (Short Integer)
- Output timer value (Real)
- Readback timer value (Real)
- Simulation option (Boolean).

Outputs

- One real output (Real)
- Up to three readback outputs (Real)
- Fail-safe output value (Real)
- Set fail-safe request (Boolean)
- Back calculated output (Boolean).

CP270 (WITH I/A SERIES V8.4 OR LATER) ADDITIONAL FEATURES

- Bad-input-point alarming of the conditioned measurement output signal. The output includes alarm indicator signals and user-defined alarm messages.
- Inhibiting of block alarm messages.
- Indication of the alarm level (1 to 5) and alarm type of the highest-priority active alarm for the block.
- Output is clamped within the range defined between the high and low output limits ± output span variance.
- Manual-if-Bad option detects errors in the operational status of the Fieldbus Module or input channel. If found, the block switches its input from the FBM/channel to a user-selected source for safety.
- Detection of fail-safe mode in the FBM, during which the block switches its input to a user-selected source for safety.

33 Commercial Street
Foxboro, MA 02035-2099
United States of America
www.foxboro.com
Inside U.S.: 1-866-746-6477
Outside U.S.: 1-508-549-2424
or contact your local Foxboro representative.
Facsimile: 1-508-549-4999

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