



UDC 3500 Application Note

Alarms Set Up Group

Introduction

The UDC3500 has four alarms and eight alarm setpoints. Each alarm has its own Hysteresis configuration.

An alarm is an indication that an event that you have configured (for example—Process Variable) has exceeded one or more alarm limits. There are up to four alarms available. Each alarm has two setpoints. You can configure each of these two setpoints to alarm on various controller parameters.

There are two alarm output selections for each alarm setpoint, High and Low. These allow you to choose whether the alarm activates when the measured value is above (High) or below (Low) the alarm setpoint.

You can also configure the two setpoints to alarm on the same event and to alarm for both high and low conditions.

An adjustable Hysteresis of 0 % to 100 % is provided for each alarm.

Alarms may be conveniently broken up into four types:

1. Analog – These are alarms which monitor selections that use analog values, such as Process Variable, Set Points or analog inputs. These alarms require a Hysteresis value.
2. Digital – These are alarms which monitor status that are either ON or OFF, such as Mode (e.g., Manual), Digital Input status. These alarms do not use a Hysteresis value.
3. Events – The alarms are only used with Set Point Programming and may be configured to operate at the beginning or end of a particular segment.
4. Loop Break – Loop Break is a special kind of alarm which monitors the control loop. Although this is a digital alarm (i.e., the alarm is either broken or it is not), it requires that an analog value to be configured in order to operate properly.

ATTENTION

Control Outputs take precedence over Alarms which in turn take precedence over Logic Gate Outputs. For example, if you select the Loop 2 Output Algorithm as Time Simplex, then the instrument will use Relay #3 to perform the Time Simplex output. Therefore, Relay #3 would not be available for Alarm 3 or Logic Gate functions.

The prompts for the Alarm Outputs appear whether or not the alarm relays are physically present or used for some other function. This allows the Alarm status to be shown on the display and/or sent via communications to a host computer.



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Function Prompts

Table 1 ALARMS Group Function Prompts

Function Prompt Lower Display	Selections or Range of Setting Upper Display	Parameter Definition
A1S1 VAL	Value in engineering units	<p>ALARM 1 SETPOINT 1 VALUE—This is the value at which you want the alarm type chosen in prompt A1S1TYPE to actuate. The value depends on what the setpoint has been configured to represent. No setpoint is required for alarms configured for Communications SHED. For SP Programming the value is the segment number for which the event applies.</p> <p>This prompt does not appear for “Alarm on Manual” type alarm. For example: A1S1TYPE = MANUAL.</p>
A1S2 VAL	Value in engineering units	<p>ALARM 1 SETPOINT 2 VALUE—This is the value at which you want the alarm type chosen in prompt A1S2TYPE to actuate.</p> <p>The details are the same as A1S1 VAL.</p>
A2S1 VAL	Value in engineering units	<p>ALARM 2 SETPOINT 1 VALUE—This is the value at which you want the alarm type chosen in prompt A2S1TYPE to actuate.</p> <p>The details are the same as A1S1 VAL.</p>
A2S2 VAL	Value in engineering units	<p>ALARM 2 SETPOINT 2 VALUE—This is the value at which you want the alarm type chosen in prompt A2S2TYPE to actuate.</p> <p>The details are the same as A1S1 VAL.</p>
A1S1TYPE	NONE INPUT 1 INPUT 2 INPUT 3 INPUT 4 INPUT 5 PV DEV OUTPUT SHED EV ON EV OFF	<p>ALARM 1 SETPOINT 1 TYPE—Select what you want Setpoint 1 of Alarm 1 to represent. It can represent the Process Variable, Deviation, Input 1, Input 2, Output, and if you have a model with communications, you can configure the controller to alarm on SHED. If you have setpoint programming, you can alarm when a segment goes ON or OFF.</p> <p>NO ALARM INPUT 1 INPUT 2 INPUT 3 INPUT 4 INPUT 5 PROCESS VARIABLE DEVIATION (NOTE 3) OUTPUT (NOTE 1) SHED FROM COMMUNICATIONS EVENT ON (SP PROGRAMMING) EVENT OFF (SP PROGRAMMING)</p>



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Function Prompt Lower Display	Selections or Range of Setting Upper Display	Parameter Definition
	MANUAL REM SP F SAFE PV RATE DIG INP 1 DIG INP 2 DIG INP 3 DIG INP 4 TCWARN TCFAIL PVHOLD BREAK TOTAL	ALARM ON MANUAL MODE (NOTE 2) REMOTE SETPOINT ALARM ON FAILSAFE PV RATE OF CHANGE (NOTE 11) DIGITAL INPUT 1 ACTUATED DIGITAL INPUT 2 ACTUATED DIGITAL INPUT 3 ACTUATED DIGITAL INPUT 4 ACTUATED THERMOCOUPLE WARNING (NOTE 5) THERMOCOUPLE FAIL (NOTE 6) PV HOLD (NOTE 8) LOOP BREAK (NOTE 4) TOTALIZER (NOTE 7)
Alarms for Software Options		ALARMS FOR SOFTWARE OPTIONS —The following Alarm Type selections appear only when one of the Software Options is installed.
Alarm prompts for Two Loops/Cascade Option	PV 2 DEV 2 OUT 2 MAN 2 RSP 2 FSAFE 2 PVRATE2 BREAK 2 PV2HOLD	PROCESS VARIABLE—LOOP 2 DEVIATION – LOOP 2 OUTPUT – LOOP 2 ALARM ON MANUAL MODE – LOOP 2 REMOTE SETPOINT – LOOP 2 ALARM ON FAILSAFE – LOOP 2 PV RATE OF CHANGE – LOOP 2 LOOP BREAK – LOOP 2 (NOTE 4) PV HOLD – LOOP 2
Alarm prompts for HealthWatch Option	TIMER1 TIMER2 TIMER3 COUNT1 COUNT2 COUNT3	TIMER 1 —HealthWatch Maintenance Timer 1 TIMER 2 —HealthWatch Maintenance Timer 2 TIMER 3 —HealthWatch Maintenance Timer 3 COUNT 1 —HealthWatch Maintenance Counter 1 COUNT 2 —HealthWatch Maintenance Counter 2 COUNT 3 —HealthWatch Maintenance Counter 3 ATTENTION See NOTE 9 and NOTE 10.

ATTENTION

NOTE 1: When the controller is configured for Three Position Step Control, alarms set for Output will not function.

NOTE 2: Alarm 1 is not available if the Timer is enabled because Alarm 1 is dedicated to Timer output.

NOTE 3: This Deviation Alarm is based upon deviation from whichever Local or Remote SP is active.



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<p>NOTE 4: Loop Break alarms monitor the selected control loop to determine if it is working. When enabled, the control output is checked against the minimum and maximum output limit settings. When the output reaches one of these limits, a timer begins. If the timer expires and the output has not caused the PV to move by a pre-determined amount, then the alarm activates, thus signaling that the loop is broken. The loop break timer value must be configured by the operator as the AxSx VAL entry. This value is in seconds with a range of 0 to 3600 seconds. A setting of 0 is equivalent to an instantaneous loop break when the output reaches one of its limit values.</p> <p>The amount of PV Movement required is determined by the "UNITS" setting in the Display Setup Group. For the Degrees F configuration, the PV must move by 3° in the desired direction in the time allowed. For the Degrees C configuration, the PV must move by 2° in the desired direction in the time allowed. For the "NONE" selection, the PV must move 1% of the PV range in the time allowed.</p> <p>Loop Break alarms do not have a HIGH/LOW State configuration, they are always assumed to be a HIGH state alarm.</p> <p>Only one alarm setpoint should be configured for Loop Break. If more than one is assigned, only one will function as intended and the others will not operate.</p> <p>NOTE 5: Thermocouple Warning means that the instrument has detected that a Thermocouple input is starting to fail. This alarm also triggers if the Thermocouple further degrades to the Thermocouple Fail stage or if the input fails. Not valid for input types other than Thermocouple types.</p> <p>NOTE 6: Thermocouple Failing means that the instrument has detected that a Thermocouple input is in imminent danger of failing. This alarm also triggers if the input fails. Not valid for input types other than Thermocouple types.</p> <p>NOTE 7: For Totalizer Alarms, the Alarm Setpoint value is based upon the configured Totalizer Scale Factor.</p> <p>For example:</p> <p style="padding-left: 20px;">Totalizer Scale Factor: *E4 = $1 \times 10^4 = 10,000$ Alarm Type: Totalizer Alarm SP: 400 Alarm High / Low: HIGH</p> <p>Alarm will activate when the Totalizer Value exceeds $400 \times 10^4 = 4,000,000$.</p> <p>NOTE 8: The PV HOLD alarm will turn on whenever the instrument is put into the PV HOLD mode. The Alarm Setpoint Value for this alarm is the number of seconds before the alarm turns on after the PV HOLD mode starts.</p> <p>NOTE 9: The setpoint values for HealthWatch Timer Alarms are in Hours and fractions of an hour. For example, a setpoint value of 20.10 would be for twenty hours and six minutes.</p>		



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A1S2TYPE	Same as A1S1 TYPE	ALARM 1 SETPOINT 2 TYPE —Select what you want Setpoint 2 of Alarm 1 to represent. The selections are the same as A1S1TYPE. In addition, Alarms configured in the Time Event Group may also use this setpoint (OR condition)..
A1S2 VAL	Same as A1S1 VAL	ALARM 1 SETPOINT 2 VALUE —Same as A1S1 VAL.
A1S2 H L	HIGH LOW	ALARM 1 SETPOINT 2 STATE —Same as A1S1 H L.
A1S2 EV	BEGIN END	ALARM 1 SEGMENT EVENT 2 —Same as A1S1 EV.
ALHYST1	0.0 to 100.0 % of span or full output as appropriate	ALARM HYSTERESIS FOR ALARM 1 —An adjustable Hysteresis is provided such that when Alarm 1 is OFF it activates at exactly the alarm setpoint; when Alarm 1 is ON, it will not deactivate until the variable is 0.0 % to 100 % away from the alarm setpoint. Configure the Hysteresis of the alarms based on INPUT signals as a % of input range span. Configure the Hysteresis of the alarm based on OUTPUT signals as a % of the full scale output range.
A2S1TYPE	Same as A1S1 TYPE	ALARM 2 SETPOINT 1 TYPE —Select what you want Setpoint 1 of Alarm 2 to represent. The selections are the same as A1S1TYPE. ATTENTION Not available with Relay Duplex or Position Proportional output types unless using Dual Relay PWA.
A2S1 VAL	Same as A1S1 VAL	ALARM 2 SETPOINT 1 VALUE —Same as A1S1 VAL.
A2S1 H L	HIGH LOW	ALARM 2 SETPOINT 1 STATE —Same as A1S1 H L.
A2S1 EV	BEGIN END	ALARM 2 SEGMENT EVENT 1 —Same as A1S1 EV.



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A2S2TYPE	Same as A1S1 TYPE	ALARM 2 SETPOINT 2 TYPE —Select what you want Setpoint 2 of Alarm 2 to represent. The selections are the same as A1S1TYPE. In addition, Alarms configured in the Time Event Group may also use this setpoint (OR condition). ATTENTION Not applicable with Relay Duplex or Position Proportional output types unless using Dual Relay PWA.
A2S2 VAL	Same as A1S1 VAL	ALARM 2 SETPOINT 2 VALUE —Same as A1S1 VAL.
A2S2 H L A2S2 EV	HIGH LOW BEGIN END	ALARM 2 SETPOINT 2 STATE —Same as A1S1 H L. ALARM 2 SEGMENT EVENT 2 —Same as A1S1 EV.
ALHYST2	0.0 to 100.0 % of span or full output as appropriate	ALARM HYSTERESIS FOR ALARM 2 —Same as ALHYST1.
A3S1TYPE	Same as A1S1 TYPE	ALARM 3 SETPOINT 1 TYPE —Select what you want Setpoint 1 of Alarm 3 to represent. The selections are the same as A1S1TYPE. ATTENTION Not applicable with Relay Duplex or Position Proportional output types unless using Dual Relay PWA.
A3S1 VAL	Same as A1S1 VAL	ALARM 3 SETPOINT 1 VALUE —Same as A1S1 VAL.
A3S1 H L A3S1 EV	HIGH LOW BEGIN END	ALARM 3 SETPOINT 1 STATE —Same as A1S1 H L. ALARM 3 SEGMENT EVENT 1 —Same as A1S1 EV.
A3S2TYPE	Same as A1S1 TYPE	ALARM 3 SETPOINT 2 TYPE —Select what you want Setpoint 2 of Alarm 3 to represent. The selections are the same as A1S1TYPE. In addition, Alarms configured in the Time Event Group may also use this setpoint (OR condition). ATTENTION Not applicable with Relay Duplex or Position Proportional output types unless using Dual Relay PWA.
A3S2 VAL	Same as A1S1 VAL	ALARM 3 SETPOINT 2 VALUE —Same as A1S1 VAL.




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A3S2 H L	HIGH LOW	ALARM 3 SETPOINT 2 STATE —Same as A1S1 H L.
A3S2 EV	BEGIN END	ALARM 3 SEGMENT EVENT 2 —Same as A1S1 EV.
ALHYST3	0.0 to 100.0 % of span or full output as appropriate	ALARM HYSTERESIS FOR ALARM 3 —Same as ALHYST1.
A4S1TYPE	Same as A1S1 TYPE	ALARM 4 SETPOINT 1 TYPE —Select what you want Setpoint 1 of Alarm 4 to represent. The selections are the same as A1S1TYPE. ATTENTION Not applicable with Relay Duplex or Position Proportional output types unless using Dual Relay PWA.
A4S1 VAL	Same as A1S1 VAL	ALARM 4 SETPOINT 1 VALUE —Same as A1S1 VAL.
A4S1 H L	HIGH LOW	ALARM 4 SETPOINT 1 STATE —Same as A1S1 H L.
A4S1 EV	BEGIN END	ALARM 4 SEGMENT EVENT 1 —Same as A1S1 EV.
A4S2TYPE	Same as A1S1 TYPE	ALARM 4 SETPOINT 2 TYPE —Select what you want Setpoint 2 of Alarm 4 to represent. The selections are the same as A1S1TYPE. In addition, Alarms configured in the Time Event Group may also use this setpoint (OR condition). See Section Error! Reference source not found. ATTENTION Not applicable with Relay Duplex or Position Proportional output types unless using Dual Relay PWA.
A4S2 VAL	Same as A1S1 VAL	ALARM 4 SETPOINT 2 VALUE —Same as A1S1 VAL.
A4S2 H L	HIGH LOW	ALARM 4 SETPOINT 2 STATE —Same as A1S1 H L.
A4S2 EV	BEGIN END	ALARM 4 SEGMENT EVENT 2 —Same as A1S1 EV.
ALHYST4	0.0 to 100.0 % of span or full output as appropriate	ALARM HYSTERESIS FOR ALARM 4 —Same as ALHYST1.
ALM OUT1		LATCHING ALARM OUTPUT 1 —Alarm output 1 can be configured to be Latching or Non-latching.



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	NoLATCH LATCH	<p>NoLATCH —Non-latching LATCH—Latching</p> <p>ATTENTION When configured for latching, the alarm will stay active after the alarm condition ends</p> <p>until the  key is pressed.</p>
BLOCK	DISABLE ALARM 1 ALARM 2 ALARM 3 ALARM 4 ALARM12 ALARM123 ALRM1234	<p>ALARM BLOCKING—Prevents nuisance alarms when the controller is first powered up. The alarm is suppressed until the parameter gets to the non-alarm limit or band. Alarm blocking affects both alarm setpoints.</p> <p>DISABLE—Disables blocking ALARM 1—Blocks alarm 1 only ALARM 2—Blocks alarm 2 only ALARM 3—Blocks alarm 3 only ALARM 4—Blocks alarm 4 only ALARM 1 & 2—Blocks alarm 1 and 2 only ALARM 1, 2 & 3—Blocks alarm 1, 2 and 3 only ALARM 1, 2, 3 & 4—Blocks all alarms</p> <p>ATTENTION When enabled on power up or initial enabling via configuration, the alarm will not activate unless the parameter being monitored has not been in an alarm condition for a minimum of one control cycle (167 ms).</p>
DIAGNOST	DISABLE ALARM 1 ALARM 2 DISWARN	<p>DIAGNOSTIC ALARM—Monitors all Current Outputs configured for 4-20mA operation for an open circuit condition. If any of these outputs falls below about 3.5 mA, then an Alarm is activated. This configuration is in addition to whatever was selected for AxSxTYPE.</p> <p>DISABLE—Disables Diagnostic Alarm ALARM 1—Alarm 1 is diagnostic alarm ALARM 2—Alarm 2 is diagnostic alarm DISABLE WARNING—Disables Output Fail messages on lower display</p>