



# **GERDA Alarm Levels and Corresponding Actions**

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GERDA Project

## GERDA Alarm Levels and Corresponding Actions

Process Procedure Number GERDA-PROC-2009-0x REV.0

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Last Revised by:

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Marco Balata  
(GLIMOS) .....

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**new subjects.**



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Table 1: List of GERDA generic alarm levels and associated typical events.

Alarm level/status	typical event
LOW / GREEN	standard operation
ELEVATED / YELLOW	loss of insulation vacuum due to air leak
HIGH / ORANGE	microscopic leak in one cryostat wall
SEVERE / RED	macroscopic leak in one cryostat wall



Table 2: Trigger values of COP and ACP parameters for GERDA alarm levels. Digital outputs H/L indicate correct/faulty status of the respective parameter. The unit 'bara' denotes absolute pressure in bar.

Alarm level	code	COP1 bara	COP2 mbar	COP3 H/L	ACP1 H/L	ACP2 m <sup>3</sup> /h	ACP3 °C	ACP4 ℓ/s	ACP5 °C
GREEN									
	G1	< 1.5	< 10 <sup>-4</sup>	H	H	< 500	> 2	> 5	> 6
YELLOW									
	Y1				N <sub>2</sub> =L				
	Y2			L					
	Y3							< 5	
	Y4	> 1.5							
	Y5								2-6
ORANGE									
	O1				Ar=L				
	O2				H <sub>2</sub> O=L				
	O3		10 <sup>-4</sup> -10 <sup>-1</sup>			< 2000			
RED									
	R1		> 10 <sup>-1</sup>			> 2000			
	R2					> 5000			
	R2								< 2

COP1: cryostat pressure - PT115 & PT118

COP2: insulation vacuum - PT205 & PT208

COP3: fill level, LT151 - LT152, PT153-1&2, TT160-1&2, TT161-1&2

ACP1: partial pressure - RGA220, RGA221, RGA222

ACP2: mass flow thru heater - DPT305, DPT309

ACP3: exhaust gas temperature at exit of heater - TT306, TT307

ACP4: flow rate of water thru heater - FT310

ACP5: water temperature at exit of heater - TT303

redundant  
sensors

average of values  
used

**all values prelim**

GERDA Alarm Levels

Isola, 16 June 2009

Table 3: Actions for specified alarm codes. Note that the actions specified for code R2 need confirmation by the guard. Automatic/manual executions of actions are designated by A/M.

Code	action
G1	none
Y1	send Y1 alarm (A)
Y2	(1) close valve LCV102 at valve box (A) and/or (2) close valve HV134 at LAr storage tank (M)
Y3	run backup system using water of the water tank (A)
Y4	send Y4 alarm (A)
Y5	run backup system using water of the water tank (A)
O1	(1) request (A) to leave hall A, and (2) drain water tank (A) at standard flow rate (NIER: 50ℓ/s ) and (3) increase ventilation throughput (A/M?)/
O2	dto
O3	dto
R1	(1) request (A) to evacuate hall A, and (2) drain water tank (A) at enhanced flow rate (NIER: 115ℓ/s ) AND (3) increase ventilation throughput (A/M?) and (4) increase flow rate of water (A) through heater H300 up to 11ℓ/s
R2	(1) perform actions (A) for alarm code R1, and (2) use water from water tank for heater (A), and (3) close highway tunnel (M: by guard action).



Table 4: Actions in case of general alarms. Automatic/manual remote executions of actions are designated by A/M

Code	action
FIRE	(1) evacuate hall A and (2) drain water tank (A)
OXYGEN DEFICIENCY	evacuate hall A
EARTHQUAKE	(1) evacuate hall A and (2) drain water tank (A)



# PLC code exemplified for 'yellow1' & 'yellow2'

SIMATIC Cryostat\SIMATIC 06/05/2009 12:19:11 PM  
300(1)\CPU 315-2 DP\...\OB1 - <offline>

```
>R
)
= "Green" M50.0
= "HMI".GREEN DB200.DBX442.0
= DB11.DBX 0.0
```

Network: 7 Alarm Condition YELLOW 1

```
AN "PSH223" I0.7 -- PPM100 relay, partial pressure air above threshold
A "PSH224" I1.0 -- PPM100 relay, partial pressure argon above threshold
A "PSH225" I1.1 -- PPM100 relay, partial pressure water above threshold
AN "Orange" M50.7
AN "RED" M51.3
= "Y1" M50.2
= "HMI".Y1 DB200.DBX442.2
= DB11.DBX 0.1
```

Network: 8 Alarm Condition YELLOW 2

```
A(
O(
L "LNL" MD32 -- Average fill Level of LT151-153
L -7.000000e+002
>R
)
O(
L "NoLevel" MW30 -- Number of active Transmitters in Level Control
L 1
<I
)
)
AN "Orange" M50.7
AN "RED" M51.3
= "Y2" M50.3
= "HMI".Y2 DB200.DBX442.3
= DB11.DBX 0.2
```

Network: 9 Alarm Condition YELLOW 3

## Concluding Remarks

draft available since March  
input from a few tg-leaders ► new subjects  
to be submitted to LNGS if GLIMOS gives ok  
trigger values and logic still preliminary

open points:  
actual water drainage speed (low /high)  
automatic / manual / remote control of water valves  
dto of backup water circuit (i.e. using water from WT)

END