

Annexe documentation to all RTC versions

General changes

This information sheet is an annexe to the RTC documentation and gives information about changes and improvements to the software version 4.13 or higher.

Flow units changed

The software update changes all of the RTC inflow signals units from m³/h to L/s. Before a software update, think about the units change.

Warnings

RTC related sub-screens will change to yellow (warning).

The RTC can also transmit the information of the **DEVICE WARNINGS** to the PLC with the YAB117 device.

[Table 1](#) and [Table 2](#) show the RTC status messages.

Table 1 Device warnings I

Device warnings I	Warning	Description	Solution
Bit 00	MODBUS ADDRESS	The RTC menu SET DEFAULTS was selected. This deleted the Modbus address of the RTC module in the sc1000 controller.	Access the following menu and set the correct MODBUS address. Go to: MAIN MENU>RTC MODULES/PROGNOSYS>RTC MODULES>RTC>CONFIGURE>MODBUS> ADDRESS.
Bit 01	PROBE SERVICE	A configured sensor is in service mode.	Go to the TEST/MAINT menu of selected sensor and end the SERVICE mode.
Bit 02	SENSOR MISSING	A selected sensor was disconnected from the sc1000 network.	Connect the sensor to sc1000 network again.
Bit 03	SENSOR FAIL	A selected sensor shows an error.	Look at the error mode of selected sensors. Refer to the sensor documentation for troubleshooting information.
Bit 04	SENSOR EXCEPTION	A selected sensor supplied an unknown signal to the sc1000 network.	Contact technical support.
Bit 05	CH1: FALLBACK STRATEGY	Channel 1 of the RTC module started the fallback strategy.	Examine the missing measurement values of channel 1 of the RTC module.
Bit 06	CH2: FALLBACK STRATEGY	Channel 2 of the RTC module started the fallback strategy.	Examine the missing measurement values of channel 2 of the RTC module.
Bit 07	ANALOGUE INPUT1 FAULTY	RTC analogue input 1 is defective.	Attach the analogue signal supply to RTC module.
Bit 08	ANALOGUE INPUT2 FAULTY	RTC analogue input 2 is defective.	
Bit 09	ANALOGUE INPUT3 FAULTY	RTC analogue input 3 is defective.	
Bit 10	ANALOGUE INPUT4 FAULTY	RTC analogue input 4 is defective.	

Table 2 Device warnings II

Device warnings II	Warning	Description	Solution
Bit 02	LIMIT ACTIVE	A user-defined parameter sets a limit for the RTC operation.	If necessary, make sure that the limiting parameters are correctly set. Make the necessary adjustments.
Bit 03	CHECK "SELECT SENSOR"	RTC module receives less measurement values than necessary. This warning usually occurs with the SENSOR MISSING warning.	Make sure that all necessary instruments are selected in the SELECT SENSOR menu.

Errors

RTC related sub-screens will change to red (error). The related message will show in the RTC sub-screen.

RTC can also transmit the information of the **DEVICE ERRORS** to the PLC with the YAB117 device.

Table 3 shows the RTC error messages.

Table 3 RTC error messages

Device errors	Error	Description	Solution
Bit 00	RTC MISSING	There is no communication between RTC module and RTC communication card.	Supply RTC module with voltage. Examine the connection cable. Set the power of the sc1000 and the RTC module to OFF. Wait until the system is completely voltage free. Set the power of the sc1000 controller and the RTC module to ON.
Bit 01	RTC CRC	The communication between RTC module and RTC communication card was cancelled.	Make sure that the +/- connections of the connector cable between RTC and RTC communication card in the sc1000 are installed correctly. Make the necessary changes.
Bit 02	CHECK CONFIG	The sensor selection of the RTC module was removed by removal or selection of a new sc1000 controller.	Go to: MAIN MENU>RTC MODULES/PROGNOSYS>RTC MODULES>RTC>CONFIGURE>SELECT SENSOR, select the correct sensor for the RTC again and confirm.
Bit 08	TOO MANY PROBES	Too many sensors selected in the SELECT SENSOR menu.	Go to the SELECT SENSOR menu. Select no more than 15 probes.
Bit 09	TOO MANY MEASUREMENTS	The probes selected in the SELECT SENSOR have too many measurements to be operated by the RTC communication card.	Go to the SELECT SENSOR menu. Select the number of probes that have no more than 15 measurement values.
Bit 10	RTC FAILURE	A general reading/writing error of the CF card, which was possibly caused by a brief interruption to the power supply.	Acknowledge the error. If the message frequently shows, remove the cause of power disruptions. If necessary, contact technical support.

Table 3 RTC error messages (continued)

Device errors	Error	Description	Solution
Bit 03	SYNTAX ERROR	Error in PROGNOSYS *.bin-file.	Update the version of PROGNOSYS files. Contact technical support.
Bit 04	FORMULA TO LONG		
Bit 05	ARGUMENT		
Bit 06	LOGIC FUNCTION		
Bit 07	BOUNDARY FUNCTION		

RTC101 P-module

Fallback strategy

The fallback strategy is easier to program. Instead of two different profiles, only one profile is used for the fallback strategy dosing volume.

2-channel combination

The software can use a 2-channel combination of closed- and open-loop control. It is possible to use only one phosphate measurement for feedback and feed forward. It is possible to control two dosing pumps in one lane (Channel 1 = closed-loop, Channel 2 = open-loop).

Feed forward mode

The name of the parameter CORR. FACTOR has changed, refer to [Table 4](#).

Table 4 Changed name

Parameter	Description
CORRECTION DOSAGE	Correction in % for precipitant dosing rate

RTC105 N/DN-module

Added time frames for fallback strategy

As an alternative to the use of NITRI MAX and DENTRI MAX as the time frame for the fallback strategy, these parameters are selected now independently. Refer to [Table 5](#).

Table 5 New parameters

Parameter	Description
NITRI SUBST.	Nitrification time in the fallback mode.
DENITRI SUBST.	Denitrification time in the fallback mode.

New parameters for denitrification and nitrification

If a specific parameter selected with the SELECT SENSOR menu is higher than the adjustable threshold (C/N//P MAX MAX), the denitrification will stop. The nitrification will independently start on NH₄-N, NO₃-N readings and at the time frame selected. For example, use this function if an Enhanced Biological Phosphorus Removal during denitrification causes not satisfactory high PO₄-P concentrations (CNP OVERRIDES NIT.MAX = NO).

It is possible to use the same input parameter to extend the nitrification period if the concentration is higher than the threshold (CNP OVERRIDES NIT.MAX = YES). Refer to [Table 6](#).

Table 6 New parameters

Parameter	Description
C/N/P-MAX MAX	Threshold for selected parameter to stop denitrification/extend nitrification.
CNP OVERRIDES NIT. MAX	When active, extends the nitrification period if the parameter is higher than threshold.

New parameter to stop nitrification

If the NH₄-N concentration is lower than a programmed NH₄-N limit (NH₄-N MIN MIN), the nitrification will stop. This is done independently from currently measured NO₃-N concentration to prevent unwanted aeration times. Refer to [Table 7](#).

Table 7 New parameter

Parameter	Description
NH ₄ -N MIN MIN	Stops nitrification if NH ₄ -N is lower than the programmed value.

DO concentration during nitrification

The correct DO concentration during nitrification is automatically calculated based on the measured NH₄-N and NO₃-N concentration at the beginning of the nitrification period (only for N/DN on Standardized Combined—does not apply for standalone RTC). Refer to [Table 8](#).

Table 8 New parameter

Parameter	Description
SETPOINT DO MIN	Minimum DO concentration for nitrification.
SETPOINT DO MAX	Maximum DO concentration for nitrification.

DO controller on RTC103 N-module and RTC105 N/DN-module

The DO controller on the N-RTC and N/DN-RTC can control a maximum of six blowers. Two blowers can have a Variable Frequency Drive (VFD) installed to supply a smooth adjustment of the aeration intensity. The software operates the blowers with a procedure that keeps the blower efficiency at a maximum level and the switching frequency to a minimum level. Make sure to configure VFD blowers as the first and the second¹ blower. If more blowers are available, configure the blowers as number 3 to 6 in ON/OFF operation mode only. Refer to [Table 9](#) for the RTC105 N/DN-module, refer to [Table 10](#) for the RTC103 N-module. [Table 11](#) shows the mixing parameters and [Table 12](#) shows the aerator parameters.

Table 9 Parameters for DO controller on RTC105 N/DN-module

O ₂ CONTROL	
<i>Stage control only</i>	
MAX O ₂	Sets the maximum O ₂ concentration (in mg/L) to change to a lower blower stage.
MIN O ₂	Sets the minimum O ₂ concentration (in mg/L) to change to a higher blower stage.
DERIVATIV.TIME	Selects the derivative time for the DO controller (in minutes).
<i>VFD control only</i>	
SETPOINT DO	Sets the DO set point during the nitrification (in mg/L).
P GAIN DO	Sets the GAIN for the PID controller (in 1/mg/L).
DERIVATIV.TIME	Selects the derivative time for the DO controller (in minutes).
INT PART	Sets the integral part for the DO control.

¹ If available

Table 9 Parameters for DO controller on RTC105 N/DN-module (continued)

O2 CONTROL	
DAMPING	Sets the Damping value (in minutes). This value has an effect on the switching frequency between stages. A value more than 10 minutes causes lower switching frequency between stages.
BLOCKING TIME FORW	Sets the minimum operating time (in minutes) in a stage before a switch in same direction is permitted (switching again to a higher aeration stage or switching again to a lower stage).
BLOCKING TIME BACK	Sets the minimum operating time (in minutes) in a stage before a switch in opposite direction is permitted (switching to a higher stage after switching to a lower stage or switching to a lower stage after switching to a higher stage).
START STAGE MIN	Sets the minimum aeration stage (in stage) and intensity at the beginning of nitrification. E.g., for a fixed frequency and a second VFD blower a value of 1.4 gives the result to stage 2 for the digital output (both blower operating) and the VFD blower operating with 40% intensity.
START STAGE DURATION	Sets the maximum duration (in minutes) of the fixed starting stage. During this time the DO controller is stopped.
START STAGE STOP	After the DO concentration level is at the % value of the DO set point, the fixed start stage is stopped.
START STAGE MEMORY	The controller saves the blower stage after the total time (START STAGE DURATION + START STAGE MEMORY). If the blower stage is higher than the value stage in START STAGE MIN, then the next nitrification starts with this blower stage value.
SUBST AERATION	The DO controller will output this stage and intensity if there is a DO measurement failure (in stage) (Fall back level).

Table 10 Parameters for DO controller on RTC103 N-module

O2 CONTROL	
<i>Stage control only</i>	
DERIVATIV.TIME	Selects the derivative time for the DO controller (in minutes).
<i>VFD control only</i>	
P GAIN DO	Sets the GAIN for the PID controller (in 1/mg/L).
DERIVATIV.TIME	Selects the derivative time for the DO controller (in minutes).
INT PART	Sets the integral part for the DO control.
DAMPING	Sets the Damping value (in minutes). This value has an effect on the switching frequency between stages. A value more than 10 minutes causes lower switching frequency between stages.
BLOCKING TIME FORW	Sets the minimum operating time (in minutes) in a stage before a switch in same direction is permitted (switching again to a higher aeration stage or switching again to a lower stage).
BLOCKING TIME BACK	Sets the minimum operating time (in minutes) in a stage before a switch in opposite direction is permitted (switching to a higher stage after switching to a lower stage or switching to a lower stage after switching to a higher stage).
SUBST AERATION	The DO controller will output this stage and intensity if there is a DO measurement failure (in stage) (Fall back level).

Table 11 Parameters for Mixing

MIXING	
MIXING PAUSE	Sets the time period without mixing (in minutes).
MIXING TIME	Sets the time period for mixing (in seconds).
<i>VFD control only</i>	
MIXING INTENSITY	Sets the intensity of mixing in stage 1 (values from 10 to 100%).

Table 12 Parameters for Aerators

AERATORS	
<i>VFD control only</i>	
0/4...20mA	Selects the current output.
VFD I MIN 1	Sets the limit for the analog output (mA) to the value of minimum frequency for blower (in %). Usually, this is only used if VFD is configured with a 4/0 mA value of 0 Hz.
VFD I MIN 2	Sets the limit for a second analog output (in %).
NO. OF STAGES	Number of blowers/stages available
AERATION ALWAYS ON	Select NO to set blower stage=0 (OFF) during nitrification phases with high DO readings. Use this parameter to prevent unwanted energy consumption by blowers.
<i>VFD control only</i>	
P MIN AERATOR 1	Blower volume capacity at minimum frequency (in %) of blower volume capacity at maximum frequency for aerator 1.
P MIN AERATOR 2	Blower volume capacity at minimum frequency (in %) of blower volume capacity at maximum frequency for aerator 2.
P MAX AER2/AER1	Relation of maximum aeration intensities between the two VFD blowers (in %). This value is 1 if the blowers have equal capacity.

RTC112 SD-module and RTC113 ST-module

New parameter to the INPUT/OUTPUT LIMITS

Refer to [Table 13](#) for the new I/O parameter.

Table 13 New parameter

Parameter	Description
FEED FLOW LOW STOP DOS	A threshold is calculated with the formula that follows. $\text{Threshold} = (\text{FEED FLOW LOW STOP DOS}) \times (\text{FEED FLOW LOW})$ in [L/s] When the actual flow to the machine is lower than this threshold, polymer dosing completely stops. Use this parameter to prevent thickening/dewatering machinery that is clogged with very low feed flow (in %).

HACH COMPANY World Headquarters
 P.O. Box 389, Loveland, CO 80539-0389 U.S.A.
 Tel. (970) 669-3050
 (800) 227-4224 (U.S.A. only)
 Fax (970) 669-2932
 orders@hach.com
 www.hach.com

HACH LANGE GMBH
 Willstätterstraße 11
 D-40549 Düsseldorf, Germany
 Tel. +49 (0) 2 11 52 88-320
 Fax +49 (0) 2 11 52 88-210
 info-de@hach.com
 www.de.hach.com

HACH LANGE Sàrl
 6, route de Compois
 1222 Vézenaz
 SWITZERLAND
 Tel. +41 22 594 6400
 Fax +41 22 594 6499

