

H3000 Analog Alarm Annunciator



User's Manual

H3096-41 E

SELCO A/S

Betonvej 10 DK-4000 Roskilde
Denmark

Phone: 45 7026 1122 - Fax: 45 7026 2522

e-mail: selco.dk@selco.com

www.selco.com

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1 Description of the H3000 Analog Alarm Annunciator

Alarm annunciator for use with all types of analogue sensors that provide a 4 - 20mA current, or voltage signals from 0 - 10V DC. Features 16 analogue inputs and 32 programmable alarms. Ideal for use with thermocouple and PT100 transmitters.

- 16 inputs for use with analogue signals
- Each of these inputs accepts both current and voltage signals
- 8 digital inputs for external control signals
- 32 alarms with individual reference to any of the 16 inputs
- Logging of 32 last alarm states
- Large LCD (Liquid Crystal Display) and user friendly keyboard
- LCD shows measurement for one selected input
- Programmable 16 character LCD text for each alarm
- Alarm delay programmable within the range of 100 ms to 100 minutes
- 5 local LEDs with user defined indication of new and acknowledged alarms.
- Up to 4 x 16 programmable remote LEDs on four remote H3100 Indicator Panels
- Each LED can be programmed to annunciate one or more alarms
- 8 internal open collector outputs provide on/off control of 8 external devices
- Up to 4 x 16 programmable external open collector outputs on four H3200 Relay Modules
- Each of the 8 outputs, as well as the external outputs, can be assigned to one or more alarms
- Built-in siren relay
- User friendly, PC based, configuration through RS232 interface
- RS485 interface for field-bus communication
- Standard MODBUS-RTU protocol

1.1 Application

The H3000 provides a versatile and cost-effective solution where multiple analogue sensors are to be surveyed. The 16 inputs of the H3000 will accept both current and voltage sources, and almost any type of sensors can be connected through use of standard current transmitters.

1.2 Function

The H3000 features a total of 32 programmable alarms. Multiple alarms (up to 8) can be assigned to the same input to provide annunciation at different input levels and selectable delays. An alarm is announced when the input passes above or below a critical level, indicated by the set point. Annunciation of an alarm can be displayed on any one of the 5 LEDs located on the front plate, as well as on any of 64 LEDs on separate remote panels. Up to four H3100 Indicator Panels can be connected to the H3000, via a 4 wire connection, which includes power supply to panels. In addition, up to four H3200 Relay Modules can be attached, giving the possibilities of the user defined control over up to 64 relays. The maximum number of external panels/modules is four.

Each LED will indicate new alarms with flashing light and acknowledged (reset) alarms with steady light. The user can acknowledge all new alarms by pressing the “YES” key.

There is also a built-in siren relay for siren control. The siren is activated at any new alarm. The siren can be silenced by the “BELL” key.

Each alarm can be programmed to control one of the 8 open collector (on/off) outputs provided at the rear connectors of the H3000. The 8 open collector outputs are ideal for controlling devices that require an alarm dependent on/off signal.

The front plate includes an illuminated LCD display with 2 lines of 16 characters. The LCD provides the user with a 16 character alarm description, the actual input measurement and other useful information.

If the H3000 is used in systems with the H0300 Event Logger, the H0300 will distribute the time and date via the RS485 interface to all H3000s connected. The H3000 will display this in the first line in the display and also log all events (changes in alarms) with the date and time. Last 32 events are stored in the memory and can be reviewed.

The H3000 can be configured through the RS232 connection using an ANSI compatible terminal (e.g. HyperTerminal, which is supplied with the Windows operating system). In the configuration the inputs, the alarms and alarm related parameters are defined (see chapters 5 and 6 for details), and the configuration can be saved to disk for later downloading.

1.3 Mounting

The SELCO H3000 is a compact unit intended for flush mounting. Dimensions (H x W x D): 96 x 144 x 110 mm.

The H3000 is intended for mounting in a control panel or a switchboard door. The H3000 should be mounted in such a way that the display is clearly visible, and so that the operator is able to easily access the keyboard.

Computer based configuration requires access to the rear of the unit in order to attach the RS232 DB9 plug. Remember to take into account the depth of the DB9 plug when planning the installation.

1.4 Front panel



The H3000 front plate consists of display, keyboard, 2 green and 5 red LEDs and a user defined text label for describing the 5 red LEDs.

1.4.1 Display

The LCD display on the front panel has 2 times 16 characters. It has the adjustable backlight, which provides a good visibility in all conditions.

1.4.2 Keyboard

8 keys are arranged in two groups: 4 arrows and 4 intervention keys. Arrow keys are used for navigation through logged events or selecting parameters in the Configuration Menu. The remaining 4 keys are: YES to acknowledge the alarm, BELL to switch off the siren, NO to abandon changes and CFG to enter the Configuration Menu.

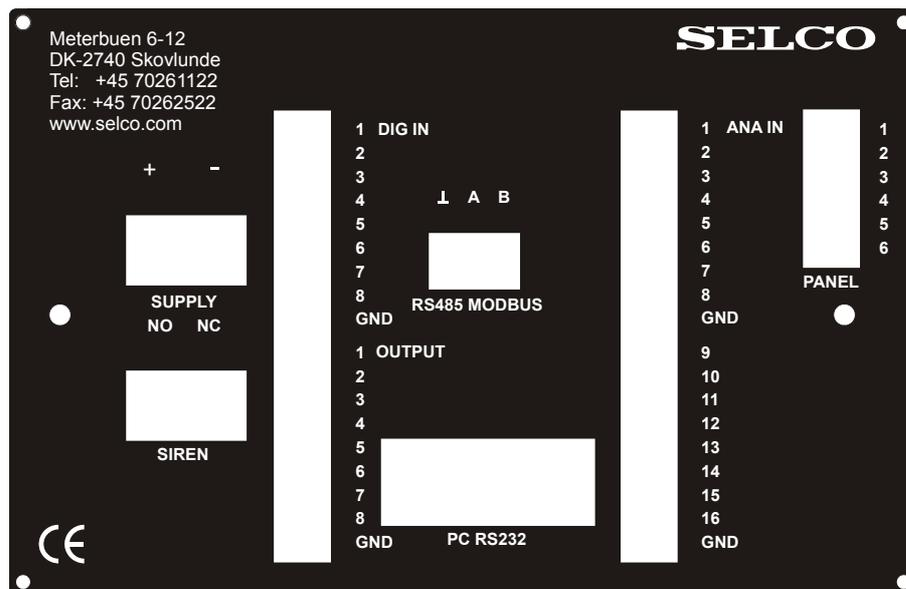
1.4.3 Local LEDs

The green LED PWR shows that the power supply is on. The LED RUN shows that communication with a MODBUS Master is taking place (see chapter 8). Five red LEDs are fully user definable, which means that they can be attached to one or more of the defined alarms. When more than one alarm are attached to the same LED the LED is in OR relation with the alarms (the LED is off only if all the related alarms are inactive and acknowledged).

1.4.4 Text label field

This field is a transparent pocket where a text label can be inserted, with a short user explanation of the alarms assigned to each of 5 red LEDs.

1.5 Rear Panel



1.5.1 Power supply

A 24V DC power supply connector is located on the upper left of the rear panel.

1.5.2 Siren output

Output from the built-in siren relay is available on a 3-pole connector. Remember that the siren normally should be connected to the NC contact (i.e. middle contact and right contact).

1.5.3 Digital inputs

There are 8 digital inputs, 5 of them are in use for various control signals. The first 3 are not used at the moment, but reserved for future use (see chapter 10).

1.5.4 Outputs

8 digital open collector outputs are for connection of up to 8 external relays. The outputs are fully user definable, which means that they can be attached to one or more of the defined alarms. When more than one alarm are attached to the same output the output is in OR relation with the alarms (the output is off only if all the related alarms are inactive).

1.5.5 MODBUS connection

This is a 2 wire RS485 connection to the MODBUS Master, the H0300 Event Logger or to a PC with an RS485 card and OPC Server visualisation software (e.g. the MODBUS OPC Server and the GraphWorX module in the GENESIS32 package from Iconics).

1.5.6 RS232 connection to PC

This connection enables the full configuration, which will make use of all the features offered by H3000. The configuration is described in details in chapters 5 and 6.

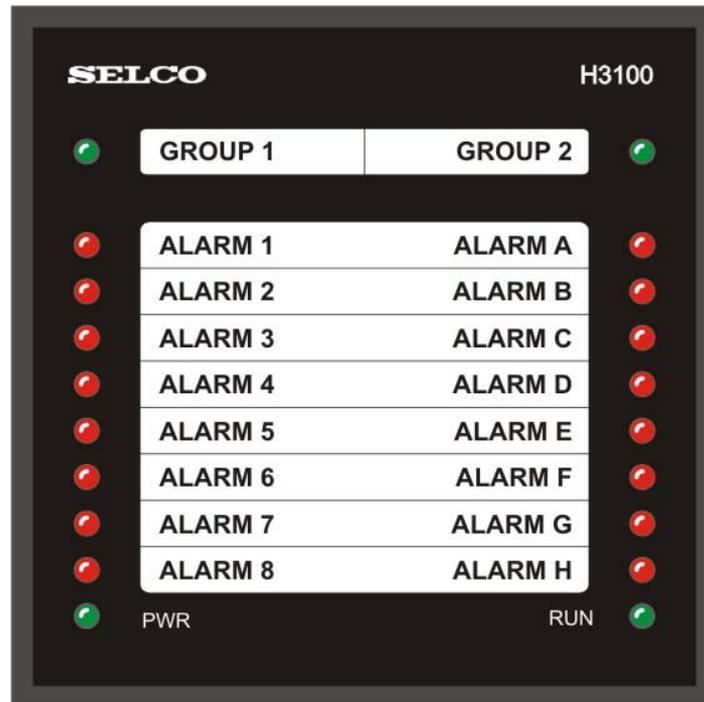
1.5.7 Analogue inputs

Up to 16 analogue inputs can be connected to H3000, which means that up to 16 different process parameters can be surveyed simultaneously.

1.5.8 Connection of H3100 Indicator Panel(s) and/or H3200 Relay Module(s)

The H3100 Indicator Panels are remote LED panels for H3000. Up to four panels, each with 16 remote LEDs, can be connected to H3000. The same connector is used for connecting up to four additional H3200 Relay Modules. A free combination of up to four H3100/H3200 units can be attached.

2 Description of the H3100 Indicator Panel



H3100 Indicator Panel is a remote (up to 6 meters distance) LED indicator, intended for presenting the active alarms in a convenient and distinct way. Each of the 16 alarm LEDs is user programmable, which means that they can be attached to one or more of the defined alarms. When more than one alarm are attached to the same LED, the LED is in OR relation with the alarms (the LED is off only if all the related alarms are inactive and acknowledged).

First coming new alarm is indicated by a quick flashing LED. The following new alarms are indicated with normal flashing LEDs. When the alarms are acknowledged on H3000, all the LEDs, representing still active alarms, will turn to steady light, and will light until the related alarms disappear.

The connection between Indicator Panels H3100 and H3000 is 4 wires, including power supply to the units. As the communication between H3000 and H3100 is a key issue for H3100 to function, its status is represented by a green LED RUN, which is placed in the lower right corner. As long as the communication exists, the RUN LED lights, and that is a guarantee that the H3100 is displaying valid information.

If any of the Panels, to which H3000 is programmed to send information, is not responding, error will be reported by H3000. The siren will turn on, the first line of display will show: "PANEL FAILURE !". This message will stand, and siren will be on, until first confirmation by YES key is given. It is recommended to check the Panel(s) immediately and repair the failure. After that, H3000 must be restarted, by switching power off and on again.

Any useless Panel on the local bus, i.e. the one which is never addressed, can be easily discovered by the user, because its LED RUN doesn't light. The reason for the missing communication might be the incorrectly set address jumpers.

3 Description of the H3200 Relay Module

The same way as the H3100 Indicator Panel is programmed by the user to obtain remote LED indications of the alarms, the H3200 Relay Module is used to get the activation of relays, according to the user specified schedule. 16 available relay channels on one H3200 unit are fully programmable, i.e. the user can join any of the relay channels to any of the alarms, or one channel to more alarms. In this last case the status of the relay channel will be in OR relation with the attached alarms.

The H3200 module has the over current protection of all 16 outputs. In case that any of the channels gets the current higher than 160 mA, the module will automatically switch off all channels and the failure will be reported to the user through H3000 display and siren. On the H3200 module the red LED will be blinking.

As the communication between H3000 and H3200 is a key issue for H3200 to function, its status is represented by a green LED RUN. As long as the communication exists, the RUN LED lights, which is a guarantee that the H3200 is in working condition.

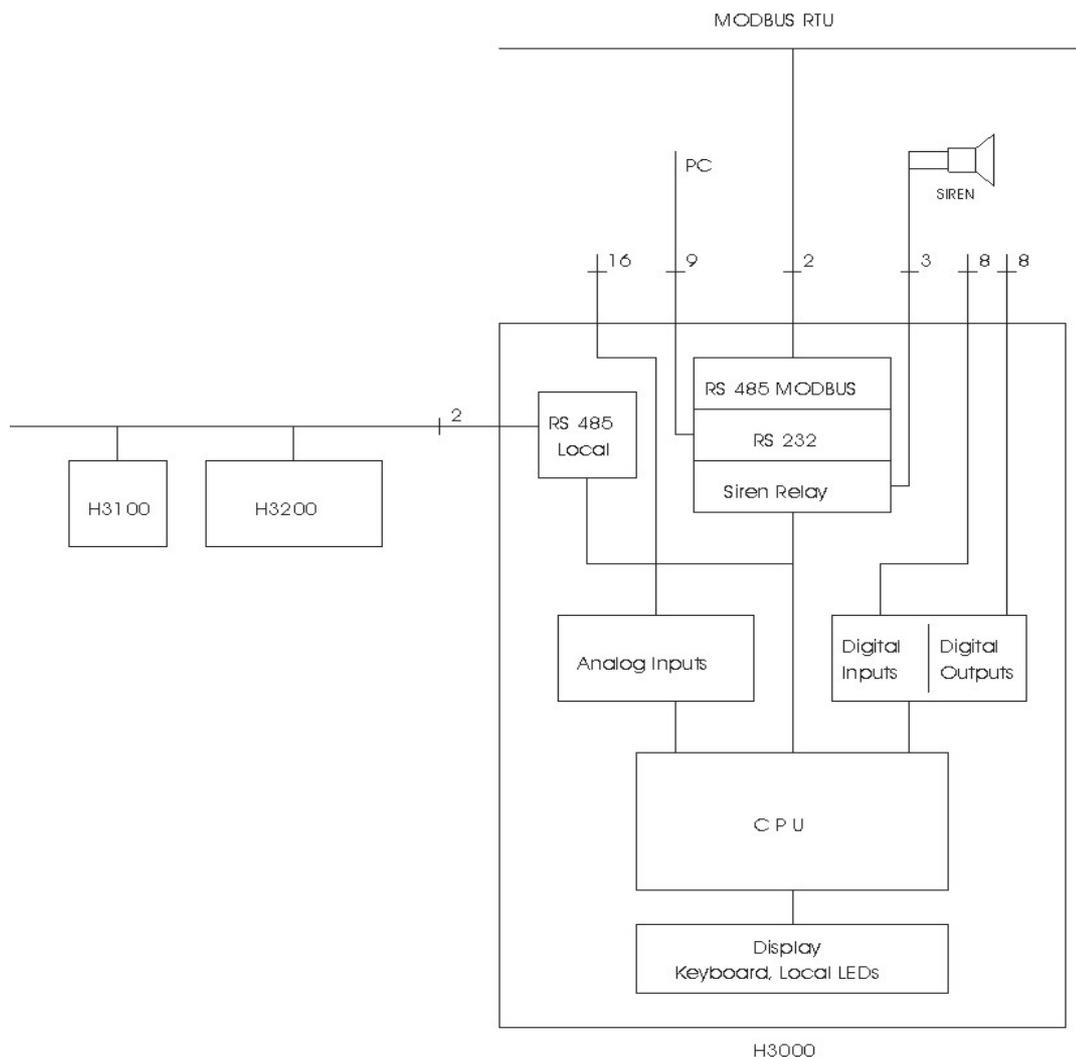


Figure 3.1: Block Diagram of H3000 system

4 RS232 Terminal

Configuration is conducted through the RS232 connection using an ANSI compatible terminal (e.g. HyperTerminal, which is supplied with the Windows operating system).

All important information about how to install and configure HyperTerminal program can be found as a separate document, on SELCO web site, under H3000 Support.

5 Configuration of the H3000 Analog Alarm Annunciator

5.1 Basic terms

Upon delivery, H3000 is “empty”. Neither input channels nor alarms are defined in advance, as it is a completely flexible and user defined device. Therefore, the first step for the user is to configure it and thereby adapt the H3000 for his own needs.

H3000 supports two types of standard measuring inputs: current and voltage.

The current input must be of the type which gives 4mA as the lowest input limit and 20mA as the highest. Inputs lower than 4mA are automatically reported by H3000 as input failures (it is either a cable break or transducer error). Inputs higher than 20mA are not treated as errors, but already above 20.5 mA they are not measured correctly.

Standard **voltage** measuring **input** is from 0V DC to 10V DC. (Cable breaks are not automatically detected by H3000 when voltage inputs are applied).

All necessary parameters are programmed into the H3000 by use of a set of commands. These commands can be typed-in directly from a Terminal program. But they can also first be prepared in an Editor, saved as text-file and after sent to H3000 (the procedure is described in 5.5).

Typing “?” will give a list of all available commands.

There are some common rules, which are valid for all commands:

- The command interpreter makes no difference between capital and small letters. In the given examples capitals are used only for better distinction from the text.
- First 5 letters of commands are recognized, the rest is ignored.
- Blanks are never obligatory (nor do they confuse the interpreter, unless e.g. they are placed in the middle of command name). Also bear in mind that the line length is limited to 25 characters. This limit however is not applied to WRTEXT command (5.3.3).
- Comma is used as data separator. It also means that when decimal numbers are entered, the decimal point is marked only by “.”(dot), and not by “,” (comma).
- Errors in typing are corrected by use of “Backspace”. The effect is that cursor is moving left (one or more positions), and then the correct characters should be typed over.
- Every line must begin with a letter, to be accepted as a command. If it begins with anything else: a number, blank, etc, the whole line is ignored. The only exception is “?”, used for help.
- All commands are responded by H3000 with either “OK” or “ERROR”, but also “EMPTY”, “ABANDONED”, “Unknown command”, etc. Of course, only “OK” means that the command was successfully executed.

5.2 Definition of Input channels

There are 3 commands for definition, and one for overview, of the input channels. A maximum of 16 input channels can be defined.

5.2.1 SETINPUT

This is the main command. The user declares the number of input channel, type of input (I or V), lower boundary and upper boundary of the measuring range, i.e. the physical value corresponding to 4mA (0V DC) and the one corresponding to 20mA (10V DC). The values can have a maximum of 4 digits, and they can be entered with or without decimal points.

```
SETINPUT 1, I, -20, 100
```

Channel 1 is current type, 4mA represents -20, and 20mA 100 (of some units).

It's very important that Input channels must be defined in order from 1 to the last, not jumping over empty places (otherwise "ERROR" is sent back from H3000). But, if SETIN is applied to an existing channel, it will be simply changed, without warning.

In the example above, decimal points were not given, so they will be interpreted as -20.00 and 100.0. Maximum value must be a non-negative value.

Instead of "I" - "C" (current) may be used. As sign of voltage input, both "U" and "V" are accepted.

SETINPUT can include the optional switch "G", which sets the channel as a "group-channel", read more in chapter 6.

5.2.2 WRUNIT

This command is used to write the name of physical unit, which will appear on display together with the actual physical value

```
WRUNIT 1, " kVAr
```

Name can be from 1 to 4 characters long, it starts after " character (only one !), the leading blanks are ignored, if the name is shorter, the rest of field is filled up with blanks.

5.2.3 DELINPUT

```
DELIN (no parameters)
```

This command deletes the LAST Input channel. Before that, H3000 will ask (with, say, 10 defined channels): "To delete input 10 ? (y/n)". The answer "y", given within 5 seconds, will really delete the channel and report "OK". Any other answer, or timeout, will only end with the message "ABANDONED".

5.2.4 Overview of Input channels: INPLIST

INPLIST (no parameters)

This gives the list of all defined input channels, types, lower, upper boundaries, names of physical units, as well as the sign that the channel belongs, or not, to “group-channels”:

```
>inpli
```

Ch	Typ	Min	Max	Unit	Group
1	I	0	600.0	oC	+
2	I	0	600.0	oC	+
3	I	0	600.0	oC	+
4	I	0	600.0	oC	+
5	I	0	600.0	oC	+
6	I	0	600.0	oC	+
7	U	-20.00	100.0	kVAr	-
8	I	0	2000.	A	-
9	I	0	600.0	oC	-
10	U	0	10.00	bar	-
11	I	-40.00	19.98	oC	-
12	U	49.00	51.00	Hz	-
13	I	40.00	199.9	mA	-
14	I	0	600.0	oC	-
15	U	0	10.00	bar	-
16	I	-40.00	19.98	oC	-

OK

If channel number is added, only that channel is shown:

INPLI 4 – only input channel 4 is shown.

In case that none of channels is yet defined, the answer is “EMPTY”.

5.3 Definition of Alarm values

For basic definition of alarm values, 3 definition- and 2 overview-commands are available.

5.3.1 SETALARM

By this command, the user declares the number of alarm, number of input channel that the alarm is joined to (input reference), sign “greater” or “less”, and finally the physical alarm value:

```
SETALARM 2, 1, < - 16.5
```

This alarm will be numbered as 2, it is referred to the input channel 1 (which must already have been defined), and will be active when the input value is under -16.5 kVAr (as defined in 5.2.1 and 5.2.2).

Alarm numbers can be in the range from 1 to 32. Unlike with input channels definition, alarm numbers can be defined freely, not in any precise order, only, they must refer to existing channels.

A maximum of 8 alarm definitions can be made on one input channel.

As answer to the command, the H3000 will send back the short overview of all defined alarms which refer to the same input channel, in this case:

```
Ch   Al.no   Al.Value
  1     2     < - 16.50
OK
```

If an incorrect input was made, such as missing parameter, or value out of range, H3000 will report “ERROR” and no other action will be made.

If an alarm with the given number already exists, there are two possibilities: that only alarm value is changed for the same input channel, or another input channel was chosen by the user. In the first case, H3000 will ask for confirmation: “To overwrite alarm 2 ? (y/n)”. The answer “y”, given within 5 seconds, will set new alarm parameters and report “OK”. Any other answer, or timeout, will only write the message “ABANDONED”.

Important: In case of changing the minimum and/or maximum values for an **input channel**, the **alarm values** defined for that channel **are not more valid** and **MUST** be redefined.

In the second case, when another channel was joined to the existing alarm, H3000 will not change it, instead it will write the warning (assumed that the alarm was referenced to input channel 1):

```
Alarm is defined for input 01, use DELAL to delete it
```

The explanation of command DELALARM is on the next page.

Another version of command SETALARM is to define a “group-alarm”, see chapter 6.

5.3.2 DELALARM

This command deletes the specified alarm. The place for this alarm will be regarded as “empty”, until a new alarm with that number is defined.

```
DELAL 2
```

Of course, H3000 will demand confirmation: “To delete this alarm ? (y/n)”. The same way as already described, the user should answer with “y”. Otherwise the command will be abandoned.

5.3.3 WRTEXT

H3000 is capable of attaching a user-defined text to all defined alarms. Text labels can be up to 16 characters long. They will appear on display, together with alarm number and status, every time the alarm status is changed. Also, when reviewing old events, stored in the logging buffer, these labels will appear together with the corresponding alarms. Text-label for Alarm 2:

```
WRTEXT 2, “ Text for Alarm 2
```

As with command WRUNIT (5.2.2), **one** “ character is needed. Leading blanks after that character are not taken into the text-label. If the text is longer than 16 characters, it will be cut off to 16, if less, blanks will be added automatically.

5.3.4 Overview of Input channels – Alarms: INPALARM

INPAL command gives the overview of all input channels with all related alarms. Also, unit names and alarm texts are shown:

```
>inpal
```

Ch	Al.no		Al.Value		Text label
1	1	<	00.0	kVAr	Neg react power
	2	<	- 16.5	kVAr	High neg react p
2	4	>	50.16	Hz	High frequency
	5	<	49.84	Hz	Low frequency

```
OK
```

INPAL 1 - would only show the specified input channel, with all alarms related to it.

5.3.5 Overview of Text-labels: RDTEXT

RDTEXT can also be followed by a single alarm number, if not, all defined text-labels are shown:

```
>rdtext
```

```
01 Neg react power
02 High neg react p
04 High frequency
05 Low frequency
```

```
OK
```

5.4 Definition of other Alarm parameters

H3000 offers a range of possibilities in dealing with alarms. One of them is choosing of LED indications: local, remote (on Panel) or none. For each alarm, delay time is programmable: from 0 to 100 minutes. Any alarm appearance can turn on one of 8 relay outputs. Alarms can be blocked by any of 3 blocking inputs (representing contacts). Also available: control of external Relay Module.

5.4.1 DELAY

By default, all new-defined alarms get delay 0. To define some delay, command DELAY is used. It contains alarm number, delay parameter – which can only be a whole number (integer value) between 0-62 – and one of four available time bases:

1	x 0,1 s
2	x 1 s
3	x 10 s
4	x 100 s.

If no time base is specified, the assumed time base is no. 2 -1 second.

Few examples:

DELAY 4, 22	- alarm 4 gets 22 s delay
DELAY 5, 48, 1	- alarm 5 gets 4.8 s delay
DELAY 6, 60, 4	- alarm 6 gets a maximum delay – 100 minutes
DELAY 7, 0	- returning of some formerly defined delay to 0

Same delay times can sometimes be defined in two ways: for instance, delay of 10 minutes can be achieved both as “DELAY a, 60, 3” and “DELAY a, 6, 4”. However, the first way, with bigger delay parameter and less time base should be preferred.

If the alarm condition disappears before the delay time is expired, nothing will happen. If it appears again, the delay time starts from the beginning.

5.4.2 LOCLED

Local LED indication is defined by this command. Numbers 1 to 5 are used, or 0 – if none desired.

LOCLED 3, 5	- alarm 3 will be present on local LED 5
LOCLED 6, 0	- removed local indication for alarm 6.

5.4.3 REMOTE

Remote LED indication, as well as Relay Module channel, is specified by the same command. The Panels, or Relay Modules, can have 4 different addresses, and therefore have 4 designators: A, B, C and D. If this designator is omitted, A is assumed. To remove the relation – 0 is used.

REMOTE 5, 12	- alarm 5 appears on unit A, channel 12
REMOTE 7, D 6	- alarm 7 on unit D, channel 6.

The rule for both local and remote LED indication is that, if more alarms are connected to one LED, it will follow the OR relation between the alarms: the LED's off state is only possible if all the related alarms are inactive. The same is valid for Relay Module.

In some cases, it's convenient to use some measurements not to make alarms, but simply to turn some devices on or off. An example could be to turn on the ventilator when the cooler comes to some higher (but not critical) temperature. All "alarms" **without any specified remote unit** will act that way, they can turn on/off one of 8 internal outputs (see 5.4.4), with or without delay, turn – or not – the local LED, but they will **not activate siren**, nor make own event logging, nor report that to the MODBUS Master (see chapter 8).

As the consequence of that, when we **need** that H3000 makes the complete **alarm** procedure, when conditions for some alarm are fulfilled, **we have to specify a remote unit**, even in case that Panels or Relay Modules are not at all used. Note again, that **no remote unit is assumed in advance**.

These rules **are not applied to group-alarms**, they always make the **complete alarm** procedure

5.4.4 OUTPUT

8 digital open collector outputs are available for connection of 8 relays (or other devices).

OUTPUT 6, 3 - alarm 6 will activate output 3

In case that more alarms are attached to the same relay, the OR relation is applied (the relay is off, only when all the related alarms are inactive).

When it is necessary to remove a previously defined connection between alarm and output, number 0 for relay should be used:

OUTPUT 6, 0

Note that the definitions for external Relay Module are made separately, by the command REMOTE (5.4.3). Alarms with defined remote units always perform full alarm procedure.

5.4.5 BLOCKING

Among the 8 digital control inputs, the 3 last inputs are used as blocking inputs: 6, 7 and 8 as "a", "b" and "c", respectively. When a blocking input is active (external contact to GND), it will make the related specified alarm **not** to appear, although, by the measured value, it should. It is used to avoid unnecessary alarms, for example when a machine is not in use. Here, it's preferred to block alarms such as "Low oil pressure".

BLOCK 8, CA - alarm 8 will be blocked by inputs "a" and "c"

Inputs "abc" can be written in any order, only WITHOUT comma or blank between them. To remove previously defined blockings, use 0 instead of "abc".

5.4.6 Overview of all Alarm parameters: ALLIST

To get a complete and clear overview of all defined alarms and alarm parameters (except text-labels) a single command ALLIST should be typed in. Without specified alarm number, it gives the overview of all defined alarms. With a given number it will give an overview of only one alarm.

```
>ALLIST
```

Al	Inputch.	Al.Value	locLED	Panel	Output	Delay	Block
1	1	< 00.0 kVAr	1	A 02	07	12 x 10s	-
2	1	> 40.0 kVAr	1	A 03	-	08 x 1.0s	--c
3	empty						
4	2	> 50.12 Hz	4	B 01	06	22 x 1.0s	-
5	2	< 49.88 Hz	5	B 02	03	52 x 0.1s	-

```
OK
```

When some alarm place is empty, which means, some alarm number, less than the highest defined alarm, is not defined, “empty” will stand behind the alarm number.

Attempt to apply ALLIST when no alarm was previously defined, will be responded with “EMPTY”.

5.4.7 DELSETUP

This command deletes the complete setup. Like with similar commands for deleting, it demands confirmation, which should be given within 5 seconds:

```
DELSET
```

```
Do you really want to delete complete setup ? (y/n)
```

```
ABANDONED
```

In this case, there was no answer in the given time. Otherwise, if “y” was typed, the whole configuration would have been deleted and “OK” sent back.

5.5 Creating and Transferring of Configuration text-file

The whole procedure of configuring the device, when many input channels and many alarm parameters should be defined, can be a tiresome and dull work. But it can be made significantly easier, if the whole text, that needs to be typed-in, is first prepared in some text editor (such as Notepad or WordPad), checked that all parameters are correct, saved on a disk, and at last transferred to the H3000.

Such a way of configuring has many other advantages. Being a pure text, it can be printed out and used as a part of the user's documentation. In the case of more, similarly configured devices, it is very easy to change it a while, and apply again. An example of such a text follows:

```
Delset
Y

1) Write input channel parameters
setinp 1,i, -20, 100
wrunit 1, "kVAr
setinp 2,u, 49, 51
wrunit 2, "Hz

2) Set alarm values
  Al 1
setal 1,1, < 0
wrtxt 1 " Neg react power
delay 1,12,3
locled 1,1
remote 1,a2
output 1,7

  Al 2
setal 2,1, > 40
wrtxt 2 " High pos react p
delay 2,8
locled 2,1
remote 2,a3
block 2,c

  Return line and char delays to 0 !

end
```

One can notice that the property of the interpreter to ignore the lines which don't begin with a letter was used to make some comment lines. The whole text will appear on the screen, as the configuration will be going on, and it's therefore convenient to add some comments. The first line will delete any eventual previous setup, the confirmation for that command is given in the next line.

Notice: Only pure texts can be used (not of type .doc, .pdf, .xls, or such). For preparing the text, a simple editor should be used (MS Word is not recommended).

For transferring of this text to the H3000, the Windows Communication program HyperTerminal is recommended. It is necessary to set the slower rate for sending characters (not the baud-rate, which remains at 9600 Bd). When HyperTerminal is open, click at File and then Properties. Choose Settings and after that ASCII Setup. In this field, it is possible to change Line delay and Character delay. Set the Line delay to 500 and Character delay to 25 ms.

To transfer the text, click on Transfer, and then Send Text File. HyperTerminal will show its own directory with *.TXT files in it. It's maybe a good idea to place the created text here, and of course, it must have the extension .TXT. When the text is chosen, transfer starts and it can be easily followed on the screen. When the transfer is over, it is recommended to return Hyper-Terminal's delay parameters to 0 - as the line before the end reminds us. (However, the zero-delays are actually only important when the command LOADCFG is applied, see the next page).

Notice: On SELCO web site, under H3000 Support, there is a short text-file, which is intended to make creating of the setup-text-file much easier. The text also contains the instructions for its use.

5.6 Saving Configuration on disk and Downloading

In addition to using a configuration text-file, as described in the previous chapter, there is another possibility of saving the configuration, which is more direct for the device and by that – much faster. There is also the inverse command, for downloading of such a file into the H3000.

5.6.1 SAVECFG

This command saves the whole configuration of the H3000. After typing the command, a short direction on how to start the Capture procedure follows:

```
>SAVEC
```

```
Transfer / Capture Text / NEW file name / Start
```

```
Press any key when ready (Esc to quit)
```

First choose Transfer (in HyperTerminal). After, when Capture is chosen, the name of some previously used file will be offered. Change that name to some **new**. (Otherwise, the file will be appended, i.e. added to the end of the offered file!) It is possible to change one's mind, before Start is clicked, and to press Escape, which will cause the procedure to be abandoned. When Start is clicked, then any other key than Escape will start the transfer of the configuration to the opened file. The lines with hex-digits will scroll up the screen. When finished, the reminder will appear, as the last line

```
Transfer / Capture Text / Stop !
```

```
OK
```

These directions need to be followed to stop Capture and close the file.

5.6.2 LOADCFG

For downloading of the file, saved by use of the previous command, the command LOADCFG is used. As with the SAVECFG, short instructions will first appear:

```
>LOADC
```

```
DELAYS 0 ! - ( This reminds to reset eventual delays in HyperTerminal ! )
```

```
Transfer / Send Text File / Open (Esc to quit)
```

Escape will abandon the procedure - if given before start of Transfer, by Open. As soon as Transfer was initiated, the number 67 appears and the countdown starts, which actually follows the speed of the transfer. When it comes to 0, transfer is finished and OK is written.

Note that there is no need of previously deleting the existing configuration. It will be, by all means, overwritten. The result of the transfer can be verified (and it is recommended) immediately by the 3 overview-commands: INPLIST, INPALARM, ALLIST.

6 Group-channels and Group-alarms

In many cases it's necessary to follow more input channels, of the same type, which in normal operating conditions must have nearly same values. Any bigger deviation of the value measured on one of the "group-channels", from the average value of all other "group-channels", should cause alarm to the operator. An example for this is temperature of each cylinder of a motor, which must be near to the temperatures of all the others in the same machine.

6.1 Setting input channel as a group-channel

To set the parameters of an input and join it to the group, the same command as described in 5.2.1 is used, only with switch "G" added after the channel number:

```
SETINPUT 3, G, I, 0, 600.
```

If some previously defined input is to be (from now on) treated as a group-channel, just write

```
SETINPUT 5, G
```

Notice: All channels in the group **must be of the same type and have the same lower and upper boundary**. There is no such check by the H3000.

6.2 Deviation from the average

The maximum allowed deviation of a single channel value from the average value of all other group-channels is defined by a single command, which is valid for all defined group-channels:

```
DEVIAT 50 (Value can be any decimal number with maximum four digits).
```

Deviation of channels is constantly surveyed by H3000, and the user-defined alarm is activated when the channel gets its value 50 less or higher than the average value for the rest of the group.

If all the defined group-channels are of either I- or V-type, "OK" is returned. If not - "ERROR".

6.3 Group-alarm

The group-alarms should be defined for each channel separately, using

```
SETALARM 12, 3, G.
```

Alarm number 12 is activated when input number 3 deviates from the average for more than 50. All other alarm parameters can be attached to this alarm: delay, LED indication, blocking, relay output. Notice that group-alarms always make the full alarm procedure, see page 18.

In alarm lists, group-alarms are marked with: > < 50.0 (assumed that deviation was set to 50).

Of course, every group-channel can also have its "individual" alarms set, as described in 5.3.1.

7 On-site Menu

A few functions of the H3000 can be performed directly from the keyboard. To enter the Menu, it is necessary to hold the key CFG pressed about 3 seconds. The 3 items to set from the keyboard are:

7.1 Display

This item is used for setting the brightness (or dimming) of the display backlight, as well as of all the LEDs. If H3100 Indicator Panels are attached, the brightness of their LEDs will change simultaneously.

Going into the Menu the item “Display” appears on the display. Press LEFT to come into the item, then “Intensity” is written, with the actual intensity level. At the same time all 5 red LEDs are turned on. The intensity level can be increased or decreased to achieve the optimal brightness. There are 16 levels of intensity, which are represented with numbers from 0 to 15. Arrow UP will increase (up to 15) and DOWN decrease (down to 0). UP or DOWN can be held constantly to get the repeat function. Pressing YES, the dimming is set and H3000 continues with its normal function.

7.2 Address

This item gives the possibility of setting the address of the unit, used when communicating on the RS485 MODBUS line. Up to 63 units can be connected on the line and each unit must have its individual address. Address 0 is reserved, therefore valid addresses are from 1 to 63.

Going into the Menu, press DOWN, and instead of the item “Display”, the next item is obtained – “Address”. Press LEFT to come in. If H3000 is new, “Unit address 01” is written. This address can be now increased by UP arrow, or after decreased by DOWN, in the range of 1 to 63. If one of these keys is held constantly, the repeat function will do the job of changing the number. When the desired address is obtained, press YES and the address will be changed and saved. Otherwise, press NO, if this change is not wanted.

7.3 LED Test

To perform an LED test on both H3000 and H3100 Indicator Panel(s) - if attached, go to Menu and by either pressing twice DOWN, or once UP, go to the item “LEDs”. Pressing LEFT will cause the text “Test ?” to appear. Press YES to perform the test (or NO to abandon). During test, all red LEDs will be on and all the LEDs on the Indicator Panel(s), too. Display will show “Test of LEDs”. After about 5 seconds all LEDs go back to their working state and H3000 continues its normal operation.

Notice: Any new alarm will cause the H3000 to leave the setup procedure and show the alarm. Also, if no key is pressed in the setup mode for about 32 seconds, the mode is self abandoned.

8 Communication

8.1 RS485 interface, MODBUS-RTU protocol

The H3000 is equipped with a 2-wire RS485 interface which supports communication by the standardized MODBUS - RTU protocol. A MODBUS master (e.g. PC, PLC or the SELCO H0300 Event Logger) can read information from (in some cases also write to) any H3000 unit connected to the common RS485 bus. Any change in the system, appearance or disappearance of alarms, loss of communication with any unit etc. is constantly monitored and recorded by the master.

In case of using a PC as master, the PC should be fitted with an RS485 card. The software could be some kind of OPC Server Visualisation Software (e.g. the MODBUS OPC Server and the GraphWorX module in the GENESIS32 package from Iconics).

A detailed description of the MODBUS protocol can be downloaded from the SELCO Web site www.selco.com.

8.2 Connection to the H0300 Event Logger

The H3000 can be connected to the SELCO H0300 Event Logger. The H0300 can log alarms and events from multiple SELCO alarm annunciators and indicator panels, connected to a common 2-wire RS485 bus. The H0300 can survey and log events from up to 63 units. The maximum cable length of the RS485 bus cable is approximately 1000 metres.

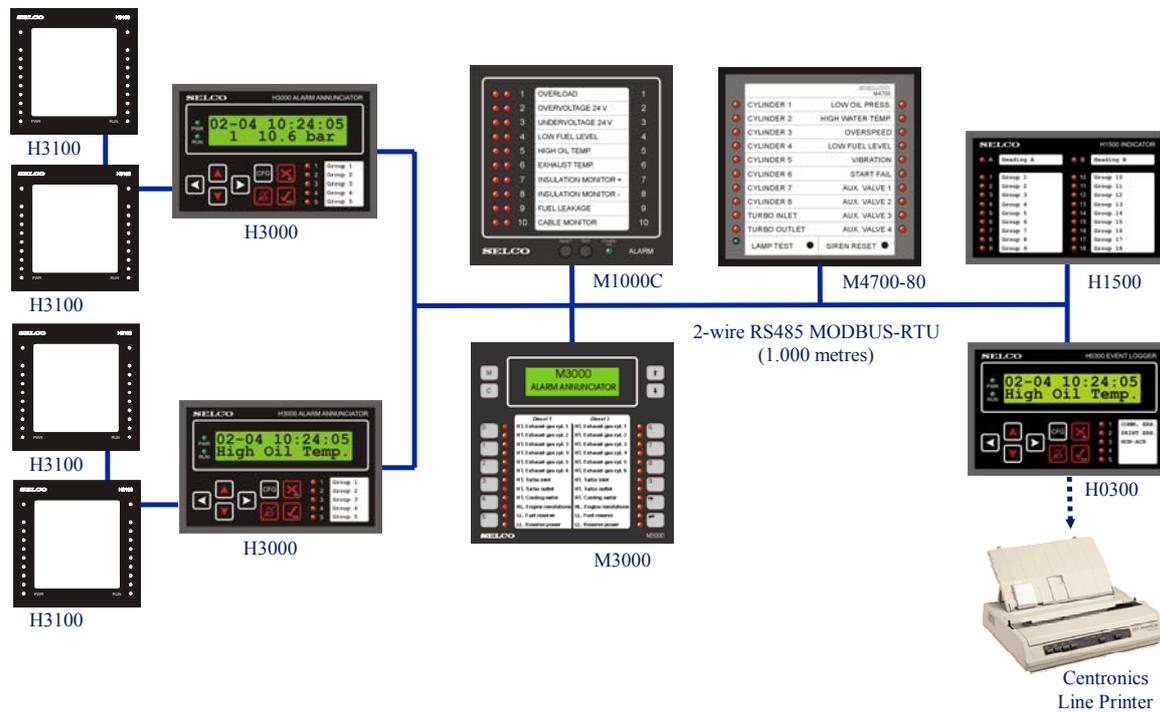
The H0300 is continuously scanning the bus, and every alarm is quickly reported. Each event is logged with date, time, unit number, channel number and a descriptive text. The latest 32 events are stored in the internal memory of the H0300. A standard Centronics printer can be connected directly to the H0300 in order to provide a hardcopy log.

The H0300 also distributes its date/time settings to all units on the bus, so the units that can make use of that – and such is the H3000 Analogue Alarm Annunciator - will have the same time setting as the H0300, and make own loggings with date and time.

The H0300 has a built-in siren relay. Alarms and events can be acknowledged at the front panel keyboard.

The H0300 can also perform an event repeating function. This function provides the convenient feature of transmitting an LED indication from one unit to another (through the 2-wire bus connection). The user can define a huge number of relations between the LEDs of the units connected to RS485 bus. Thereby it is not necessary to hardwire outputs to inputs, as the indication is transmitted over the common two-wire bus connection.

Configuration of H0300 can be done in the same way as for H3000, through the built-in RS232 interface using a standard PC with an ANSI/VT100 terminal.



In the above example, the two H3000s, as well as the M1000C Alarm Annunciator and the M3000 Analog Alarm Annunciator, could be placed in one location (e.g. the Engine Room of a ship). The Master, which is the H0300 Event Logger, can e.g. be placed in a control room (or on the bridge of a ship) together with a printer and the H1500 Indicator Panel. The H1500 is used for remote indications of group alarms. The M4700 could be placed in a third location (e.g. the Mess Room of a ship), also for remote indications of group alarms.

The two H3000s are each connected to two H3100 for local indications. In the example we can see that the lower H3000 has reported the alarm to the H0300 Event Logger.

9 Alarm presentation and Event logging

Normally, the H3000 shows one of the input channels in the second line of display. This channel can be chosen by arrows RIGHT or LEFT. RIGHT will take the next higher number of channel, and will come to channel 1 after the highest, while LEFT will act in the opposite direction, from higher to lower. Example:

```
3 174.3 oC
```

Here 3 denotes the channel number. (RIGHT would lead to channel 4, LEFT to channel 2)

If H3000 is connected to the MODBUS line, with the H0300 Event Logger as master, it will receive the time and date. So, in normal (quiet) state, the time and date will be displayed in the first display line.

When an alarm condition arises, on any input channel, the delay time, if defined, will start. When the delay is over, siren is activated, the local LED turns to quick flashing, the remote LED is also activated to quick flashing. On the display, the previous channel showing is cancelled, and the new alarm input channel is automatically selected. Assuming that the text-label had been defined, the display will toggle between 3 items (all in the second line):

```
Alarm 01 Quick fl
```

```
Neg react power
```

```
1 - 2.8 kVAr.
```

If there is no text-label defined, only the two other items appear. This exchanging of the alarm messages will last about 25 seconds. If H3000 is in connection with H0300 Event Logger, the event is immediately reported to the H0300, which makes own logs, where the address of the unit H3000 (the address is set as described in 7.2) would be added to the log.

When this event is confirmed by pressing the YES key, the local and remote LEDs turn to steady light. The display will now toggle between two items (or show only one, when text-label is missing):

```
Alarm 01 Steady
```

```
Neg react power.
```

When the alarm disappears, the H3000 will act in the same way again (only the corresponding LEDs will now go off):

```
Alarm 01 Normal
```

```
Neg react power.
```

As described in previous chapter, all events (appearance of alarms, acknowledgments of alarms by the user with the YES key and disappearance of alarms) are logged by H3000 and saved in the memory. If the H3000 is used in connection with the H0300 Event Logger, and had its watch set by the H0300, all events are logged locally in the H3000 with date and time of appearance. The last 32 events can be reviewed. Using the arrow UP key the newest event is shown.

```
Alarm 01 Normal
Neg react power.
```

“Normal” says that the alarm condition of a confirmed alarm disappeared. To go on, press UP once again

```
Alarm 01 Steady
Neg react power.
```

Here we can see that a confirmation was given. If we press the UP key once more, we will get:

```
Alarm 01 Quick fl
Neg react power.
```

All these loggings will be presented with the exact time of appearance, in the first line of display – if in this period H3000 was connected via the RS485 interface to the H0300 Event Logger.

The arrow DOWN key will navigate through the loggings in the opposite direction: from older to newer.

When we stop searching, the logging where we stopped will continue toggling for about 25 seconds. To break this and come to normal watching of an input channel, press the RIGHT or the LEFT key once.

10 Digital Inputs and Outputs

10.1 Digital inputs

There are 8 available digital control inputs. To activate one of them, a contact to GND (see the rear panel) should be made.

The first 3 inputs are not supported for the time being. They are for future use.

Input number 4 is used for Remote LED Test. A short connection to GND of this input will cause H3000 and H3100 Indicator Panel(s) - if attached - to perform an LED test in a similar manner as described in the chapter 7.3.

Input number 5 is used for Remote Reset. It will do the same function as YES on the front plate, confirm all non-confirmed alarms, but unlike with YES key, it will also switch the siren off. The Remote Reset has the unified function of YES and BELL keys on the front plate.

Inputs 6, 7 and 8 are Blocking Inputs, which are also marked as “a”, “b” and “c” respectively. The principle of blocking and the way of its programming is described in 5.4.5.

10.2 Outputs

There are 8 internal open collector outputs for connection of relays (or other DC devices). The internal transistors will connect the output to GND, when activated. Maximum allowed voltage is 32 V.

The outputs are designed for a maximum of 200mA for each output. If any of the outputs is overloaded, the H3000 will switch off **all relays**, activate the siren and write on display:

```
Output failure  
YES to restart.
```

All activities will be stopped, until the failure is removed and the YES key is pressed.

11 Specifications

H3000 Analog Alarm Annunciator

Voltage supply	24V DC -30%/+30%
Consumption	Max. 100mA
Alarm inputs	16
Input types	4 - 20mA and 0 - 10V DC
Digital control inputs	8
ADC resolution	12 bits
Alarms	32, max. 8 for one input reference
Alarm delays	100 msec - 100 min
Outputs	8 on/off open-collector outputs, each controlled by one or more alarms. Max. 200mA per output
Siren relay	ND/NE 220V AC/2A 30V DC/2A/30W
Local LEDs	5, each controlled by one or more alarms
Remote LEDs	Up to 64 (on four H3100 Indicator Panels)
Relay Module channels	Up to 64 (on four H3200 Relay Modules)
Alarm annunciation	Quick flashing LED for the first new alarm, flashing LED for the following new alarms and steady light for acknowledged alarms
LED flash frequency	5 Hz or 1.25Hz
Display	Backlit, 2 x 16 characters
Keyboard	8 keys
Bus system	2-wire RS485
Programming	Through RS232 (ANSI Terminal)
RS232 parameters	9600 bits per second None parity 8 data bits 1 stop bit
RS485 parameters	9600 bits per second None parity 8 data bits 1 stop bit
Protocol	MODBUS-RTU
Operating temperature	-10 to +70°C
EMC	CE according to EN50081-1, EN50082-1, EN50081-2, EN50082-2
Burn-in	50 hours before final test
Weight	0.6kg
Dimensions	96 x 144 x 110mm (H x W x D)
Panel cut out	92 x 138mm
Protection degree at front	IP52

The specifications are subject to change without notice.