Controller HC320

* **HC320 is a versatile controller with 2 independent limits**

* **Analogue input: 0(4)-20mA**

* **Zoomfunction: 100% at 10-20mA**

* **2 relay outputs**

* **Optional max. or min. limits**

* **Start timer and reaction timers**

* **Hysteresis function on both limits**

* **Digital input: Optional active high or low**

* **Alarm blocking using digital input**

Features

Application
HC320 is generally used for the supervision of mA signals. The signal may be delivered by a standard sensor with 4-20 mA output or from one of our HCxxx transmitters. The HCxxx familiy consists of transmitters for pH, O_2, conductivity and temperature etc. Power consumption may be supervised using the HC320 with one of our APM modules.

Analogue input
The analogue input is a current input, and may be set up to either 0-20mA or 4-20mA. Futhermore, the input may be scaled to display 100% down to 10mA.

Digital input
The HC320 may be configured to both positive and negative logic on the digital inputs. Using parameter no. 10 the input may be set to either active high og active low. With positiv logic the accepted input voltage range is 5-30Vdc. Negative logic is achieved by connecting the input to Gnd - i.e. by using a swicth.

Relay output
The unit contains two relays - one for each limit. The relays are both connection relays, but the polarity may independently be inverted using parameters no. 7 and no. 8. Alarms are reset by either pressing the 'Mode' key or by activating the external reset input, S1.

Limits
The HC320 integrates two limits. All settings for one limit may be altered independently of the other. Each limit may be set up as a Max. or Min. limit. The setpoint is set in % of the input range. The supervision may be blocked by activating the S2 input.

Start timer (Ts)
The start timer may be used to avoid alarms during startup of an unstable process. It is activated when the input reaches 5% . If the timer is set to 0 supervision is performed without using the start timer.

Reaction timers (Tr)
Each limit has a corresponding reaction timer used to avoid alarms if the limits are exceeded for short periods of time.

Hysteresis
Hysteresis may be activated on both limits. The Hysteresis band is always placed above a Min. limit and below a Max. limit. If the hysteresis function is used, an internal auto-reset function is activated. If the hysteresis function is used in combination with a Min. limit and the input signal is 0, the alarm is reset by either pressing the 'Mode' key or by activating the external reset input, S1 - no Auto reset will occur in this case.

Technical Specifications for HC320

Mechanical

Housing:	Lexan UL94V-0 (Upper)
	Noryl UL94V-0 (Lower)
Mounting:	M36 for 35 mm DIN rail
IP Class:	Housing IP40. Connector IP20
Connector:	Max 16A. Max 2,5 mm^2
	Max torque 0,6 Nm
Temp.:	-15 to +50 $^{\circ}$C
Weight:	200 g
Dimens.:	D 58 x W 36 x H 86 mm

Electrical

Power Supply:	24Vdc ±10%
Consumption:	60 mA max
Input Current Range:	(0)4-20mA, 70Ω
Digital input:	Pos. logic: 5-30Vdc
	Neg. logic: 0V
Input S1:	External reset
Input S2:	Alarm block
Relay spec.:	250Vac / 5A
CE mark:	EN61326A

Parameters

Function and Settings

The 11 progammable parameters are shown in the table to the right. The table shows **Par. no.**, name, function, programming range and default setting. To access the parameters press the 'Mode' key until the 'Setup'-LED is lit and the display reads 'P00'. The 'Up' and 'Down' keys are used to scroll through the programmable parameters. The parameter to be altered is selected with the 'Mode' key and the value is changed using the 'Up' og 'Down' keys. The new value is saved by pressing the 'Mode' key and the next parameter may now be selected. To end setup **Par. no. 00** is selected and the 'Mode' key is pressed.

Par. no. 1. Type of input is selected - 0-20mA or 4-20mA.

Par. no. 2. Indicates the type of limit 1: Min. or Max.

Par. no. 3. Indicates the type of limit 2: Off, Min. or Max.

Par. no. 4. If needed the input signal may be scaled so that a lower input signal is set to 100%. In steps of 1 mA 10-20mA may be set to 100%.

Par. no. 5. Displays the hysteresis value for limit 1 - see the figure below for placement of hysteresis band. **Note:** an internal autoreset function is activated when hysteresis is used on a limit.

Par. no. 6. Displays the hysteresis value for limit 2.

Par. no. 7. Polarity of relay 1: Inverted / Non inverted

Par. no. 8. Polarity of relay 2: Inverted / Non inverted

Par. no. 9. Auto-Shut-Down is activated (On), if the HC320 should block Min. alarms when the input is 0. As an alternative the digital input S2 may be used to block a Min. alarm.

Par. no. 10. The digital input is configured to be either active high (Hi) or active low (Lo).

Par. no. 11. is a softwarelock used to avoid changing a parameter by accident. The softwarelock is stored and reactivated if the unit is turned off and on again. If the softwarelock is active the parameter settings may be read but not altered. This also locks the setpoints and timers.

List of Parameters

Nr	Parameter	Description	Range	Default
01	Input	Analogindgang	0-20mA, 4-20mA	0.20
02	Limit 1	Type of limit	min (Lo), max (Hi)	Hi
03	Limit 2	Type of limit	Off, min (Lo), max (Hi)	Lo
04	Zoom	Scale of analogue signal	10..20mA	20
05	Hysteresis 1	Hysteresis value for limit 1	Off, 1..50	Off
06	Hysteresis 2	Hysteresis value for limit 2	Off, 1..50	Off
07	Polarity 1	Polarity for relay 1	Inverted / non inverted	n.in
08	Polarity 2	Polarity for relay 2	Inverted / non inverted	n.in
09	Auto-Shut-Down	Blocks at intentionalt stop	Off, On	Off
10	Logic	Logic for digital inputs	Neg. (Lo), Pos. (Hi)	Lo
11	Lock	Lock parameters	Off, On	Off

In addition to the parameters in the setup menu the HC320 also features parameters directly accessible. The parameters are accessed by pressing the 'Mode' key until the LED for the parameter to be altered is lit. The 'Up' and 'Down' keys are used to alter the parameter. These paremeters and their function is shown in the following table.

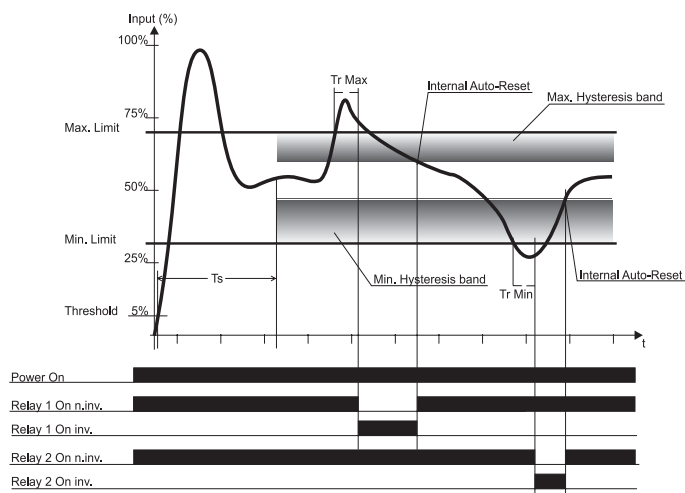| Parameter	Description	Range	Default
Ts [s]	Start up - timer	0,0 .. 999s	2,0
Limit 1	Setpoint for limit 1	5 .. 99%	80
Limit 2	Setpoint for limit 2	5 .. 99%	20
Tr [s] (Limit 1)	Reaction time for limit 1	0,00 .. 655s	0,10
Tr [s] (Limit 2)	Reaction time for limit 2	0,00 .. 655s	1,00

Peak detectors

The HC320 is equipped with a Max.- and a Min.-peak detector. The value of these is displayed by pressing the 'Up' key for Max. peak and the 'Down' key for Min. peak under 'Input [%]'. The peak detectors are reset when Ts expires or by simultaneously pressing the 'Up'+'Mode' keys for Max. peak and 'Down'+'Mode' keys for Min. peak.

Function

The drawing below shows what could be the startup of a typical AC-motor (ex. pump) immediately after power has been applied to the motor. In this example the curve shows the power consumption of the motor, but as the HC320 may be used as a controller for any given input signal, the power consumption curve is only used as an example to explain the function of the HC320. The example is especially useful for illustrating the startup timer.

Example

In the example the HC320 is set up with limit 1 as a Max. limit and limit 2 as a Min. limit. This is of course optional. The mA signal is generated by a kW transmitter.

The peak power consumption generated at motor startup is usually filtered out from the protection/control cycle using the programmable start timer (Ts). Ts is activated when the input signal reaches 5%. With Ts active all supervision is disabled. When Ts expires, the limit, hysteresis etc. become active. If the input signal drops below 5% the supervision is switched off again.

Reaction timers and Hysteresis

The drawing shows how the reaction timers (Tr Max and Tr Min) become active after the limit has been exceeded. Tr is used to avoid alarms unless the power consumption has been greater than then limit for a certain time duration. The figure also shows how a possible Maximum- and Minimum hysteresis band would be placed relative to the corresponding limit.

Relay functions

The figure under the curve shows the condition of the two relays in the non-inverted and inverted states. 'On' means that the relay is closed - i.e. there is a connection through the relay.

Auto shut-down

The generation of a Min. alarm when the motor is stopped intentionally may be avoided by enabling the auto shut-down function using parameter no. 9.

Installation