

› Monitoring Relays

Speed Control Relays

Overspeed or underspeed control, Selectable latching memory function

- › Control of overspeed, underspeed, operating rate, stopping
- › Measurement via discrete sensors - 3-wire PNP or NPN, Namur, voltage 0-30 V or volt-free contact type
- › Works with either NO or NC sensors
- › Time between pulses adjustable from 0.05 s to 10 min
- › Power-on inhibit time, adjustable from 0.6 to 60 s
- › Inhibit time can be managed via an external contact
- › Selectable latching memory function



HSV

Selection guide					
Type	Function	Measuring range	Output	Power Supply	Part-Numbers
HSV	Overspeed, underspeed, operating rate, stopping	183 → 528 V \sim	1 x 8 A (changeover)	24 → 240 V \sim	84874320

HSV

Timing

Repetition accuracy with constant parameters (according to IEC/EN 60255-1)	± 0.5%
Power ON delay	> 50 ms < 300 ms
Reset time max	In memory mode (power break): 1500 ms minimum
Delays on power up (Ti)	On energization: 0.6 → 60 s (0, +10% of full scale)
Maximum threshold crossing response time	15 ms
Reset time S2	50 ms minimum

Supply

Voltage type for actuating	AC/DC
Rated control supply voltage Un at AC	24-240 V \sim
AC supply voltage frequency 50/60 HZ	± 10%
Rated control supply voltage Un at DC	24-240 V
Voltage supply tolerance	-15% / +10%
Operating range	20.4 → 264 V \sim
Polarity with DC voltage	No
Galvanic isolation of power supply/Input circuit	No
Galvanic isolation of power supply/Output circuit	Yes
Galvanic isolation of Input circuit/Output circuit	Yes
Immunity from micro power cuts: typical	40 ms @ 24 V \sim
Maximum Power consumption at Un	AC 6.2 VA, DC 2.5 W

Insulation

Rated Insulation voltage (according to IEC/EN 60664-1)	250 V
Insulation coordination (according to IEC/EN 60664-1)	Overvoltage category III; pollution degree 3
Insulation resistance supply and Output circuit (according to IEC/EN 60664-1 and IEC/EN 60255-27)	> 500 MOhm(s) (500 V \sim)

HSV

Insulation resistance Input circuit and Output circuit
(according to IEC/EN 60664-1 and IEC/EN 60255-27)

> 500 MOhm(s) (500 V $\overline{\text{---}}$)

Insulation resistance between supply and Input circuit (according to IEC/EN 60664-1 and IEC/EN 60255-27)

N/A

Dielectric strength
(according to IEC/EN 60664-1)

2 kV / 1 min / 1 mA / 50 Hz

Impulse voltage
(according to IEC/EN 60664-1, IEC/EN 60255-1)

4 kV
wave 1.2 / 50 μ s

Input and measuring specifications

Measurement range 0.5 s - 1 s - 5 s - 10 s - 1 min - 5 min - 10 min

Number of measuring ranges 7

Display accuracy (according to IEC/EN 60255-1) $\pm 10\%$ of full scale

Measuring error with drift temperature $\pm 0.1\%$ / $^{\circ}\text{C}$ max.

Measuring error with drift voltage < 1% across the whole range

Measurement method or type Pulse transmission / detection

Repetition accuracy with constant parameters (according to IEC/EN 60255-1) $\pm 0.5\%$

Speed threshold adjustment 10 \rightarrow 100% of the range

Frequency of measured signal 0.0015 Hz min, 22 Hz max

Fixed hysteresis 5% of threshold

Input circuit 3-wire sensors PNP or NPN, 12V, 50 mA max.

Input circuit NAMUR sensor 12 V / 1.5 k Ω

Input circuit Contact
0 V min. / 30 V max. / 9.5 k Ω
High state 4.5 V min.
Low state 1 V max.

Minimum pulse time 5 ms in high and low state

Output specifications

Maximum switching power (resistive) 1250 VA

Maximum rate (at max switching power) 360 operations/hour at full load

Maximum breaking current 5 A AC/DC

Minimum breaking current 10 mA / 5 V $\overline{\text{---}}$

Operating categories (according to IEC/EN 60947-5-1 and IEC/EN 60947-5-2) AC 15 - 1 A @ 250 V, DC 13 - 1 A @ 24 V

Nominal rating 5 A

Voltage breaking capacity (according to IEC/EN 60255-1) 250 V \sim / 24 V $\overline{\text{---}}$

Electrical life (operations) 1 x 10⁵

Mechanical life (operations) 30 x 10⁶

1 or 2 changeover relays, AgNi (cadmium-free) 1 C/O

Functions

Overspeed or underspeed control True

Selectable latching (memory) function

Operating rate speed control True

Stopping control True

Startup inhibition delay control True

General characteristics

Temperature limits use ($^{\circ}\text{C}$)
(according to IEC/EN 60068-2) -20 \rightarrow +50

	HSV
Temperature limits stored (°C) (according to IEC/EN 60068-2)	-40 → +70
MTBF in hours (according to IEC/TR 62380)	894396
MTTF (according to IEC/TR 62380)	102.1 years
Led status indicator	Un: Green LED (power on) R: Yellow LED (relay status ON) OFF LED (underspeed or overspeed) In: Yellow LED (Inhibition status ON: time delay or S2) OFF LED (No inhibition) Un, R, In: Flashing LED (Position error)
Creepage distance and clearance (according to IEC/EN 60664-1)	4 kV / 9.4 mm Pollution degree 3
IP degree of protection Terminal block (according to IEC/EN 60529)	IP20
IP degree of protection Housing (according to IEC/EN 60529)	IP30
IP degree of protection Front face (according to IEC/EN 60529)	IP50
Vibration resistance (according to IEC/EN 60255-21-1)	20 m/s ² 10 Hz → 150 Hz
Relative humidity no condensation (according to IEC/EN 60068-2-30)	2 x 24 hr cycle 95% RH max. without condensation 55 °C
Electromagnetic compatibility - Immunity to electrostatic discharges (according to IEC/EN 61000-4-2)	Level III (Air 8 kV / Contact 6 kV)
Immunity to radiated, radio-frequency, electromagnetic field (according to IEC/EN 61000-4-3)	Level I (1 V/m: 2.0 GHz → 2.7 GHz) Level II (3 V/m: 1.4 GHz → 2.0 GHz) Level III (10 V/m: 80 MHz → 1 GHz)
Immunity to rapid transient bursts (according to IEC/EN 61000-4-4)	Level III (direct 2 kV / Capacitive coupling clamp 1 kV)
Immunity to shock waves on power supply (according to IEC/EN 61000-4-5)	Level III (2 kV / common mode 2 kV/residual current mode 1 kV)
Immunity to radio frequency in common mode (according to IEC/EN 61000-4-6)	Level III (10 V rms: 0.15 MHz to 80 MHz)
Immunity to voltage dips and breaks (according to IEC/EN 61000-4-11)	0% residual voltage, 1 cycle 70% residual voltage, 25/30 cycles
Mains-borne and radiated emissions (according to EN55032 (CISPR22), EN55011 (CISPR11))	Class B
Fixing: Symmetrical DIN rail (according to IEC/EN 60715)	35 mm
Mounting position	All positions
Drop to concrete floor (according to IEC/EN IEC 60068-2-31)	High: 1 m
Rigid connecting capacity without ferrule	1 x 4 ² - 2 x 2.5 ² mm ² 1 x AWG11 - 2 x AWG14
Flexible connecting capacity with ferrule	1 x 2.5 ² - 2 x 1.5 ² mm ² 1 x AWG14 - 2 x AWG16
Tightening torque (according to IEC 60947-1)	0.5...0.6 N.m
Housing material (according to IEC/EN 60695-2-11)	Self-extinguishing Incandescent wire test
Shock and bump tests (according to IEC/EN 60255-21-2)	15 g - 11 ms

HSV

Short interruption on power line
(according to IEC/EN 61000-4-11)

0% residual voltage, 250/300 cycles

Delivery: open terminals

True

Type of electric connection

Screw connection

Packaging

Compact carton recycled and recyclable
No plastic

Outline Dimensions

Depth (mm)

69

Height (mm)

90

Weight (g)

130

Width (mm) according to DIN 43880

35

International Directives & Conformity Certification

RoHS 2015/863/UE

Yes

REACH regulation N°1907/2006/CE

Yes

UK REACH regulation 2023 N°722

Yes

LVD 2014/35/UE

Yes

Directive 2012/19/EU

Yes

European Directive 2005/20/CE

Yes

ISO 14001: 2015

Yes

Certification CE

Yes

Certification UL

Yes

Certification UKCA

Yes

Certification CCC

Yes

Principles

The HSV relay controls the speed (or, more strictly speaking, the operating rate, or frequency) of a process (moving walkway, conveyor, etc.) using discrete sensors:

- 3-wire PNP or NPN output proximity sensor
- voltage input 0 - 30 V
- NAMUR proximity sensor
- volt-free contact

It can be used to monitor under OR overspeed

Operating principle

Measurement

The monitored process cycle is the succession of pulses characterised by a signal with two states: high and low. The speed measurement is obtained by measuring the duration of this signal, from the first detected change of state (either a rising or falling edge).

Digital signal processing avoids the problem of disparity of signals.

From energisation, or after the appearance (or reappearance) of the sensor signal, detection (characterisation) of the signal requires processing of one or more periods (two maximum).

During this time, control is inoperative.

Operating mode

Using the selector switch, select one of four modes:

- Underspeed without latching
- Underspeed with latching
- Overspeed without latching
- Overspeed with latching

If, on energisation, the switch is placed in one of the three intermediate positions (between "underspeed with latching" and "overspeed with latching"), the relay stays in the rest state ("alarm") and the error is signalled by all three LEDs flashing simultaneously.

The mode selector switch position is taken into account on energisation.

Modifications made during operation will have no effect: the active configuration may therefore be different from that indicated by the switch, the relay operates normally but the change in configuration is signalled by all three LEDs flashing simultaneously.

Latching

In "memory" mode, when a fault has been recorded, the HSV relay latches in the rest position ("alarm" operational state). Once the speed is correct again, the relay can be unlatched (reset) by closing contact S2 (for 50 ms minimum).

Irrespective of the speed of the controlled process, when S2 is closed the HSV relay is inhibited, the output is at the operating point ("normal" operational state); if the speed is still not correct when contact S2 is reopened, the relay latches again in the rest position ("alarm" operational state).

The HSV can also be reset, by switching off and on again several times in succession (the power break must last at least 1500 ms).

If the process speed is incorrect, this method is limited by the same restriction as resetting using S2.

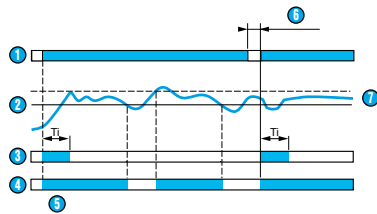
Operating principles

HSV: underspeed without memory

After the end of the inhibit delay on starting, "Ti", as soon as the measured speed drops below the threshold value, the output relay changes state, from operating point to rest position ("alarm" operational state, 11-14 open and 11-12 closed).

It returns to the initial state when the speed rises above the threshold plus the hysteresis (fixed at 5% of the displayed threshold).

After the power supply returns, following a break that has lasted at least 1500 ms, the relay is in the ("normal") operating state during the time delay and stays there until the speed is above the threshold.



- ① Voltage (S1)
- ② Threshold
- ③ Inhibit LED
- ④ Relay
- ⑤ Inhibit delay on starting (Ti)
- ⑥ 1500 ms min.
- ⑦ Speed

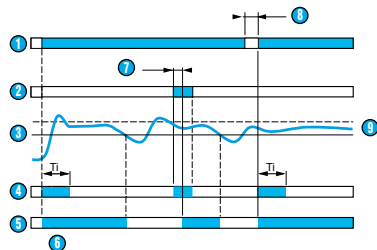
HSV: underspeed with memory

When the HSV has been configured in "memory" mode, if underspeed is detected, the output relay stays in the rest state ("alarm") irrespective of any subsequent change in the speed of the process.

It will not be able to revert to ("normal") operating state until contact S2 closes (50 ms minimum).

If, when S2 reopens, the speed is inadequate, the relay reverts to the rest latched state ("alarm").

The HSV can also be reset by a power break (1500 ms minimum); the relay then returns to the ("normal") operating state for at least the duration of the time delay, irrespective of the speed of the process.



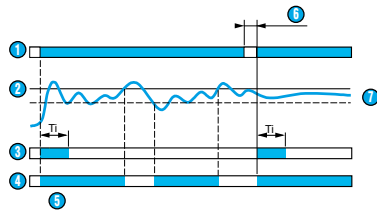
- ① Voltage (S1)
- ② Contact S2
- ③ Threshold
- ④ Inhibit LED
- ⑤ Relay
- ⑥ Inhibit delay on starting (Ti)
- ⑦ 50 ms min.
- ⑧ 1500 ms min.
- ⑨ Speed

HSV: overspeed without memory

After the end of the inhibit delay on starting, "Ti", as soon as the measured speed rises above the threshold value, the output relay changes state, from operating point to rest position ("alarm" operational state, 11-14 open and 11-12 closed).

It returns to the initial state when the speed falls back below the threshold minus the hysteresis (fixed at 5% of the displayed threshold).

After a power break that has lasted at least 1500 ms, the relay is in the ("normal") operating state during the time delay and stays there until the speed is below the threshold.

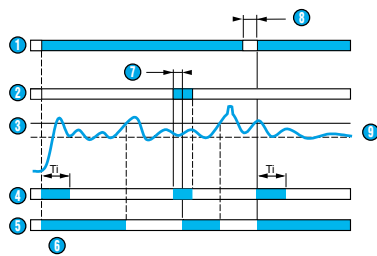


- ① Voltage (S1)
- ② Threshold
- ③ Inhibit LED
- ④ Relay
- ⑤ Inhibit delay on starting (Ti)
- ⑥ 1500 ms min.
- ⑦ Speed

HSV: overspeed with memory

When the HSV has been configured in "memory" mode, if overspeed is detected, the output relay stays in the rest state ("alarm") irrespective of any subsequent change in the speed of the process. It will not be able to revert to ("normal") operating state until contact S2 closes (50 ms minimum). If, when S2 reopens, the speed is too high, the relay reverts to the rest latched state ("alarm").

The HSV can also be reset by a power break (1500 ms minimum); the relay then returns to the ("normal") operating state for at least the duration of the time delay, irrespective of the speed of the process.



- ① Voltage (S1)
- ② Contact S2
- ③ Threshold
- ④ Inhibit LED
- ⑤ Relay
- ⑥ Inhibit delay on starting (Ti)
- ⑦ 50 ms min.
- ⑧ 1500 ms min.
- ⑨ Speed

HSV: underspeed with inhibition contact (S2)

On energisation, to allow the controlled process to reach its nominal operating speed, the HSV relay is inhibited for a period that is adjustable from 0.6 to 60 seconds.

This time delay can be modified during inhibition to be shorter or longer.

The HSV relay can also be inhibited by the closing of contact S2: on starting, for example, if the process acceleration time is more than 60 s, or at any time during operation.

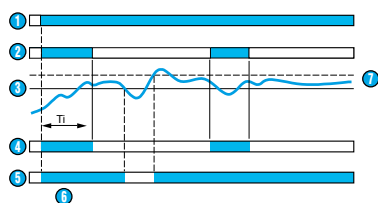
Irrespective of the origin (delay on starting or S2 closing), inhibition maintains the output relay in the "closed" position ("normal" operational state, contacts 11-14 closed and 11-12 open) and is signalled by the Inhibit LED lighting up.

If, after removal of the inhibition (end of delay on starting or opening of contact S2), the signal detection phase has not ended, the relay drops out after the expected time between two pulses (measured from the end of inhibition).

Inhibition must last for as long as required for the product to detect at least 2 periods.

If the signal type has not been determined at the end of the inhibit period, the "inhibit" LED flashes for as long as it is impossible to measure the speed.

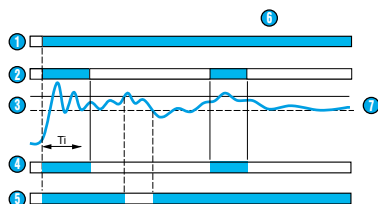
Similarly, during operation, it is possible to inhibit the HSV relay at any time by closing S2.



- ① Voltage (S1)
- ② Contact S2
- ③ Threshold
- ④ Inhibit LED
- ⑤ Relay
- ⑥ Inhibit delay on starting (T_i)
- ⑦ Speed

HSV: overspeed with inhibition contact (S2)

It is possible to inhibit the HSV relay by closing external contact S2 until the process has reached its nominal speed.

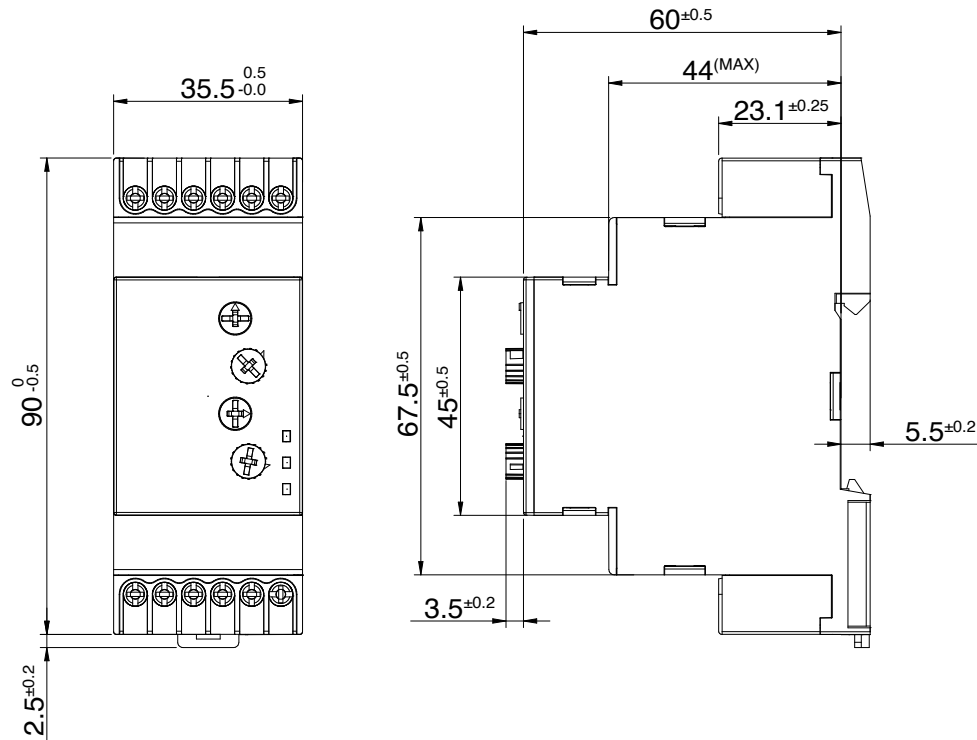


- ① Voltage (S1)
- ② Contact S2
- ③ Threshold
- ④ Inhibit LED
- ⑤ Relay
- ⑥ Inhibit delay on starting (T_i)
- ⑦ Speed

Product Dimensions

Front and Side

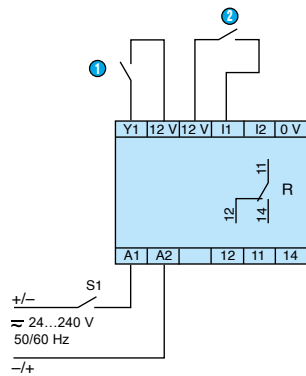
HSV



Electronic & Wiring Diagrams

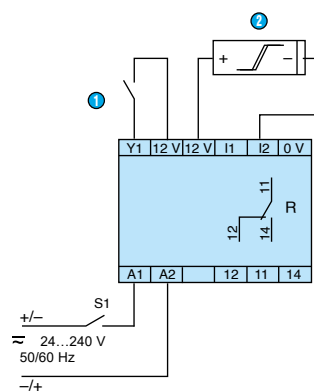
Connections

HSV - Dry Contact Input



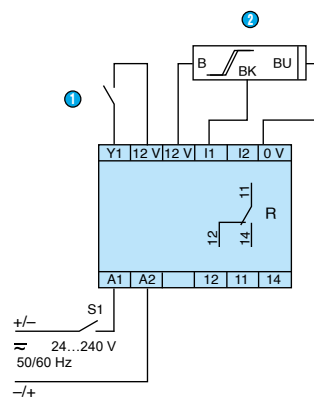
- ① S2 Inhibition - Reset
- ② Dry contact input 12 V, 9.5 k Ω

HSV - NAMUR Proximity Sensor Input



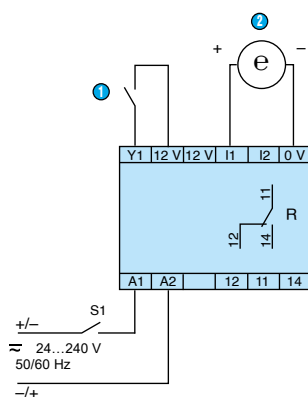
- ① S2 Inhibit - Reset
- ② NAMUR proximity sensor input 12 V, 1.5 kΩ

HSV - 3-wire PNP/NPN Proximity Switch



- ① S2 Inhibit - Reset
- ② 3-wire PNP/NPN proximity switch 12 V, 50 mA max.

HSV - Voltage Input



- ① S2 Inhibit - Reset
- ② Voltage input 0 V - 30 V

Warning:

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