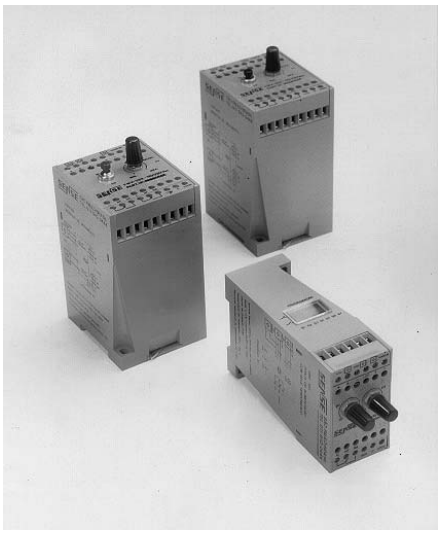
KMV

RELAY AND TIMER UNITS



Ordering Codes

KMV	-100	/110-220Vac

Terminal Box

Type
100 - sensor power supply with SPDT relay
101 - sensor power supply with DPDT relay
102 - double sensor power supply with SPDT relay
103 - sensor power supply with timer
118 - sensor level control
150 - for M8 and M12 photoelectric sensor
228 - frequency / current conversor 4-20mA
229 - frequency / current conversor 0-20mA
235 - rotation direction detector
333 - speed and rotation monitoring
400 - indicator speed and rotation monitoring

Input Voltage
bivolt - 110-220Vac
110Vac
220Vac

Power Supply with Relay
KMV-100/110-220Vac
KMV-101/110-220Vac
KMV-102/110-220Vac

Function

These are powering sources for inductive, capacitive, ultrasonic and photoelectrical sensors that have electrical configuration in continuous current.

This equipment allows the connection of proximity sensors NPN (switching the negative) PNP (switching the positive) and Namur models (which act varying the consumption current).

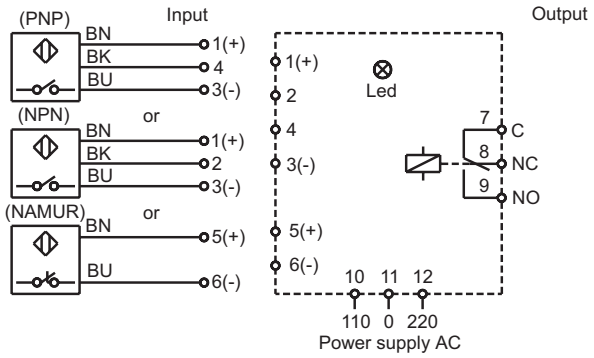
The units have an internal amplifier that can detect the sensor activation and, immediately, it energizes an output relay. Operation which is signaled through a led set up in the frontal panel of the instrument.

Recommended for making the continuous current sensors, which must activate inductive charges, such as: magnetic keys, solenoid valves, etc.

KMV-100/110-220Vac

It is a one channel model, with SPDT output relay reversible contact, set up in a box of 12 terminals.

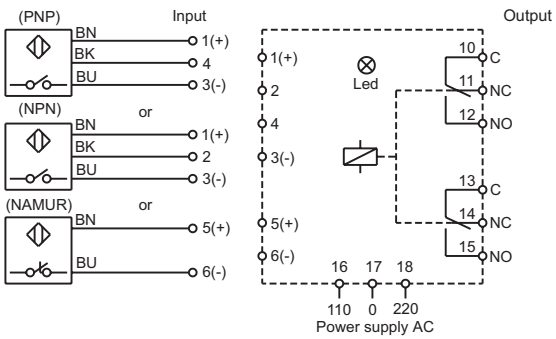
Recommended for applications where a continuous current sensor must act a power circuit.



KMV-101/110-220Vac

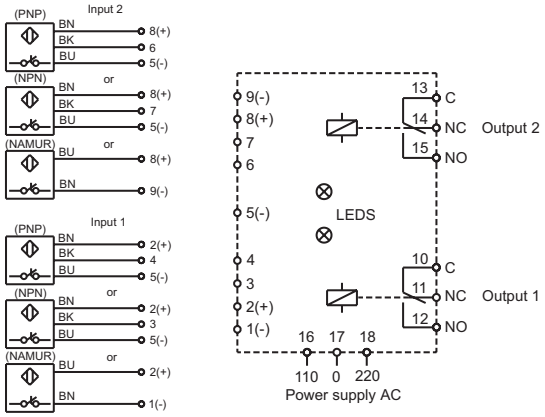
It is a one channel model, with DPDT output relay with 02 independent reversible contacts, set up in a box of 18 terminals.

Recommended for a sensor that must act two independent circuits, such as: signaling and controlling.



KMV-102/110-220Vac

An economical version for two sensors, with two independent channels and SPDT output relay with of reversible contact, set up in a box with 18 terminals.



Mechanical Construction

Set up in ABS molded plastic boxes, to be mounted up on 35mm (DIN 46277) rail or by two screws (DIN 43604).

Technical Features

Power supply

Operating voltage	110 or 220Vac
Tolerance	±10%
AC frequency	50/60Hz
Consumption	<3VA

Input Circuit

Field device	proximity sensor (NPN, PNP, Namur)
Canal numbers	see model
PNP and NPN operating voltage	12 to 17Vdc (without load)
Namur operating voltage	8Vcc ±5% (Namur)
Current consumption	I ≥ 3mA (deactivated) I ≤ 1mA (activated)

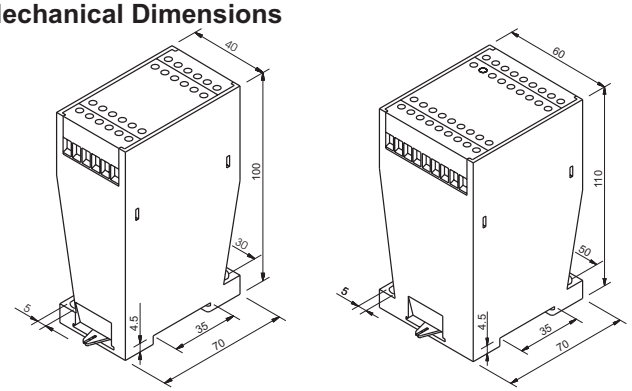
Output Circuit

Type	relay
Contacts	see model
Max. switching power	4A/250Vac
Response time	10ms

Housing

Type	plastic box (DIN)
Mounting	rail 35mm (DIN46277)
Material	ABS
Ambient temperature	-20°C to +60°C
Protection class	IP30
Weight	245g e 415g

Mechanical Dimensions



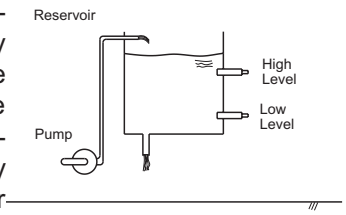
Level Control
KMV-118/110-220Vca

Applications

This is a level controller, appropriate for control in silos, reservoirs, containers, wells, etc. The control is done from a command of a mechanical level key (dry contact) or through proximity sensors, where the middle level is always kept under control, between the limits.
The instrument has a powering source, making easy the proximity sensors (capacitive, photoeletric, ultrasonic) connection, in order to detect the low and high levels.

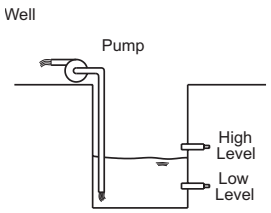
Reservoir Mode

In this mode the control energizes the output relay (which commands the pump activation) every time the Low Level sensor is deactivated, turning it off only when the High Level sensor is activated.



Well Mode

The output relay will be energized when the High Level sensor is activated, turning the pump on with the purpose of avoiding the liquid from overflow. The output will be turn off only when the Low Level sensor is deactivated.



Programming

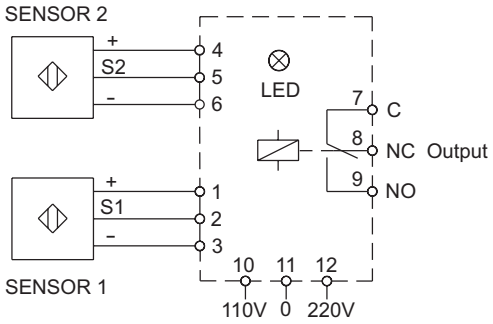
The unit has a jump, set up inside the box, which has the function of programming the operation mode (Reservoir or Well) due to the kind of proximity sensor used for monitoring the High and Low Levels, as it is shown on the chart below:

Mode	Kind of Sensor	S1 (Level)	S2 (Level)	Jump (Internal)
Reservoir	NPN- NO	low	high	A
	PNP - NO			
	NPN - NC	high	low	B
	PNP - NC			
Well	NPN - NO	low	high	
	PNP -NO			
	NPN - NC	high	low	A
	PNP - NC			

Note 1: For a clearer understanding of our chart, please check what kind of sensor will be applied (for instance: PNP capacitive sensor NO), afterwards define the required function (for instance: Reservoir) and now, check the jump position (in the example given: the jump must be placed in the A position).

Note 2: The chart also informs which one of the sensors must be set up as low and high level. In the previous example, the sensor 1 (connected to the terminals l, 2 and 3) is the one of Low Level and the sensor 2 (connected to the terminals 4, 5 and 6) is the one of High Level.

Connections Diagram



Mechanical Construction

Set up in ABS molded plastic boxes, to be mounted up on 35mm (DIN 46277) rail or by two screws (DIN 43604).

Technical Features

Power supply

Operating voltage	110 or 220Vac
Tolerance	±10%
AC frequency	50/60Hz
Consumption	2.5VA

Input Circuit

Field device	proximity sensor NPN (NO or NC) PNP (NO or NC)
Operating mode	reservoir/well

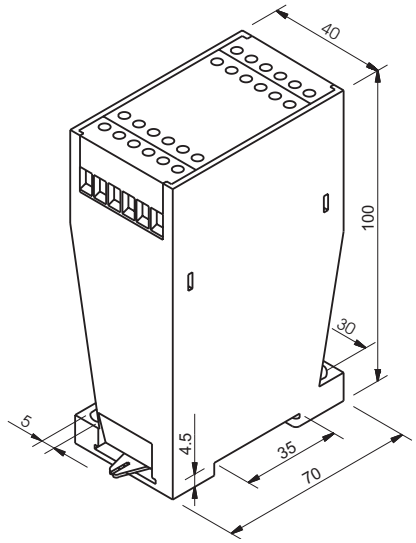
Output Circuit

Type	relay
Contacts	1 SPDT
Max. switching power	4A/250Vac

Housing

Type	plastic box (DIN)
Mounting	rail 35mm (DIN46277)
Material	ABS
Ambient temperature	-20°C to +60°C
Protection class	IP30
Weight	245g

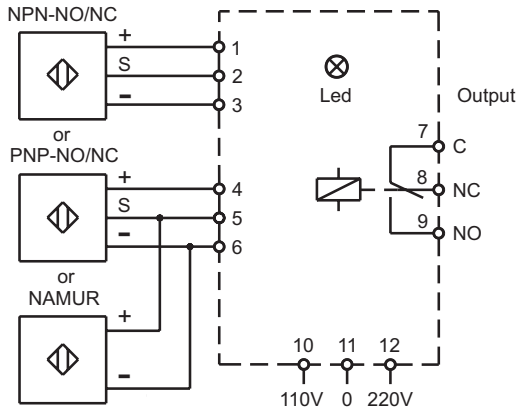
Mechanical Dimensions



Power Supply with Timer
KMV-103/110-220Vca

Function

It is a power supply for inductive, capacitive, ultrasonic and photoeectric sensors with electric configuration in continuous current.
It allows the connection of NPN proximity sensors (switching the negative), PNP (switching the positive) and the Namur models (which act according to the consumption current).



Timer

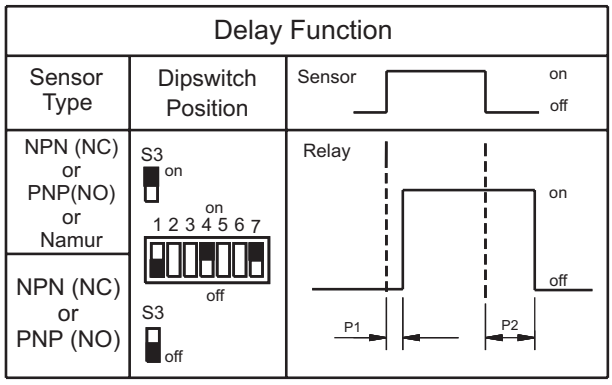
The equipment has an internal amplifier that detects the sensor activation and afterwards it activates a universal timer (programmable multi-functions) that at its time, activates the output stage, composed by a reversible contact relay SPDT.
Recommended for controlling the processes and equipment automation, where time delay is required.

Programming

KMV-103 has a set of seven dipswitch keys (which are installed in the side of the unit) for programming such as delay, due to the applied sensor, besides the required time range selection.
It also has two potentiometers set up in the front painel for the delay adjustments, within the previously programmed range in the dipswitch keys.

ON/OFF Delay Function

Every time this function is selected the potentiometers will be simultaneously activated: P1 (which commands the on-delay) and P2 (responsible for the off-delay).
In case one of the timers will not be required, just set the potentiometer at the scale least, canceling completely the equivalent delay.
The on-delay provides a delay in the relay activation, in relation to the sensor activation. Recommended for eliminating sensor false activations, besides the control functions.
Off-delay extend the relay output activation in relation to the sensor, making it recommended for the sensor quick activation situations.
For making the adjustment easier, the instrument has a led, installed in the front panel, that indicates the output relay activation.



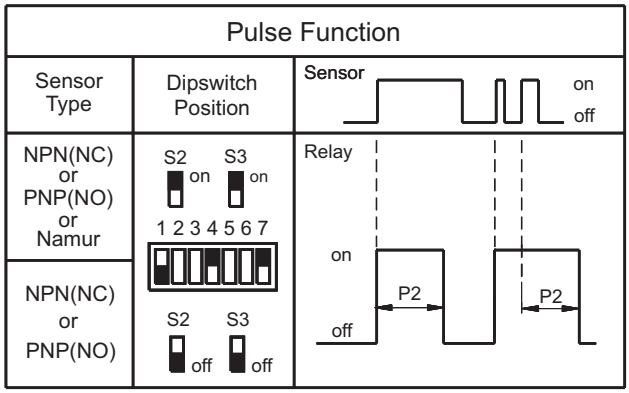
Note: It is understood as the sensor activation when the output inverts its state in relation to the rest condition. For instance, PNP (NO) in rest shows the output in “0” and when activated changes for “1”.

One Shot-Delay

Makes every output signal limited for a constant predetermined period of time, that starts the activation of the sensor and remains for the adjusted time in the potentiometer 2, independently of the sensor remain or not activated.

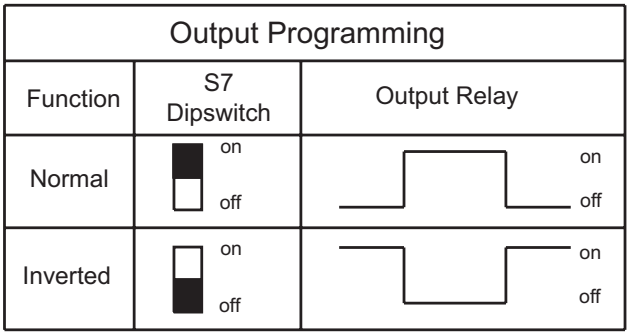
Recommended for supplying previously determined duration pulse, applicable for extending quick detections and where it is required only to detect the passing and not the presence of the object.

In this function, the potentiometer P1 will keep deactivated, independently of its position on the scale.



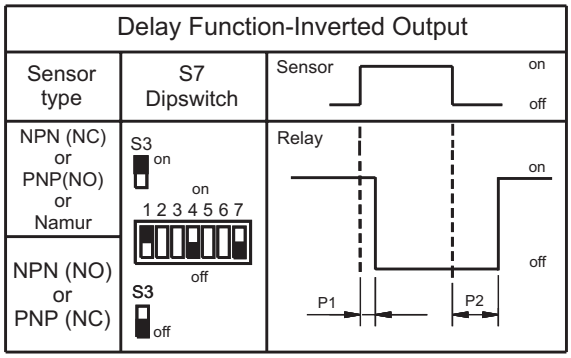
Output programming

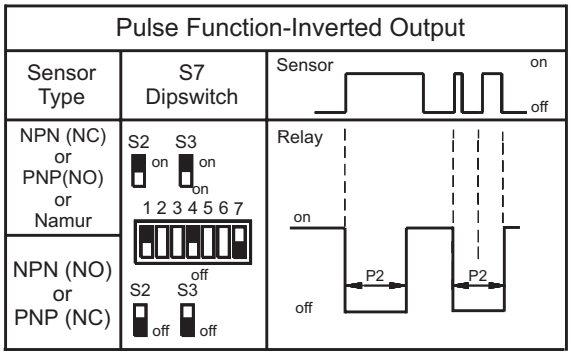
The output relay can be programmed to operate regularly de-energized (regular) or regularly energized (inverted) just acting on the S7 key, as shown below:



Inverted Output

Observe that the output relay is kept regularly energized and when the delay is completed, it turns-off





Time Range

The delay time range can be within 0 to 60 seconds, available in 3 ranges, defined by the S5 and S6 keys, as shown in the chart below:

Range	Time	S5 S6
A	0 to 0.6s	on off
B	0 to 6s	on off
C	0 to 60s	on off

It is required to use the least possible range to get the most accurate on the delays, for instance, for a certain delay of 5s it is required to programme the unit on the 0 to 6s range through dipswitch keys, and afterwards adjust the exact value (5s) in the frontal potentiometer, equivalent to the required delay.

It is also required to notice that, once the range is defined, this will determine the delay for both potentiometer. P1 (on-delay) and P2 (off-delay).

Mechanical Construction

Set up in ABS molded plastic boxes, to be mounted up on 35mm (DIN 46277) rail or by two screws (DIN 43604).

Technical Features

Power supply

Operating voltage	110 or 220Vac
Tolerance	±10%
AC frequency	50/60Hz
Consumption	2.5VA

Input Circuit

Field device	proximity sensor (NPN, PNP, Namur) or mechanical contact
Delay	on-delay, off-delay and one shot-delay
Programming	dipswitch
Timer range	A- 0 to 0.6s B- 0 to 6s C- 0 to 60s
Time adjustment	potentiometer

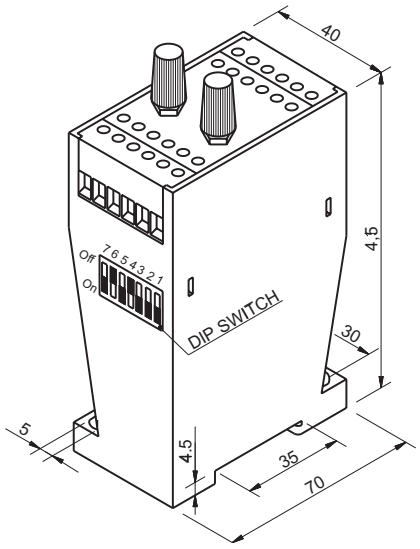
Output Circuit

Type	relay
Contacts	1 SPDT
Max. switching power	4A/250Vac
Indicator	red led

Housing

Type	plastic box (DIN)
Mounting	rail 35mm (DIN46277)
Material	ABS
Ambient temperature	-20°C to +60°C
Protection class	IP30
Weight	245g

Mechanical Dimensions:



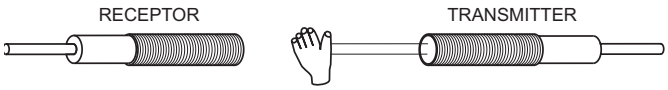
Timer Amplifier for Photoelectric Sensors KMV-150/110-220Vac

Function

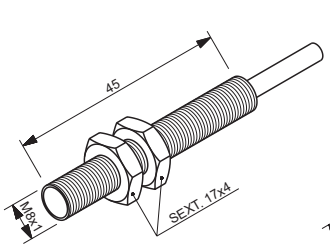
It is a power supply exclusive for photoelectric sensors that do not have de output stage incorporated.
The unit has an internal amplifier that detects the sensor activation and afterwards it activates a universal timer (programmable multi-functions), that at its time, activates the output stage, composed by a two reversible contacts relay.
Recommended for controlling processes and equipment automation where the time delay is required.

Thru-Beam Photoelectrics

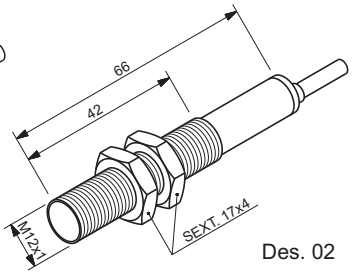
In these models the transmitter and the receiver are in two units, that must be disposed one in front of another, in such a way that the activation happens when the object cuts the light beam.



Models	Type	Sensing Distance	Diameter	Figure
TO-8H	Transmitter	0 to1m	M8x1mm	01
RO-8H	Receptor			
TO-12H	Transmitter	0 to 2m	M12x1mm	02
RO-12H	Receptor			



Des. 01



Des. 02

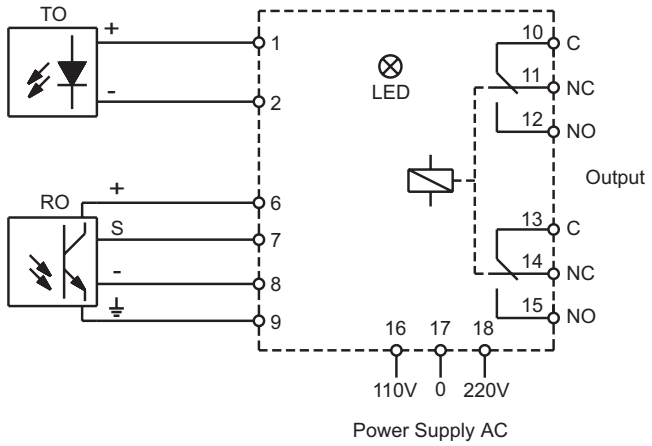
Technical Features

Light type ..... Led GaAs
Operation temperature ..... -20°C to +70°C
Sunlight immunity 11.000lux
Incandescent light immunity 3.500lux
Protection class IP64
Cable length 2m

Sensitivity Adjustment

KMV-150 has an adjust sensitivity potentiometer (P1) that has the objective of reducing the amplifier sensitivity, allowing the set to discriminate reduced objects within any distance between the transmitter and the receptor (within the specified limits on the chart above).

Connections Diagram

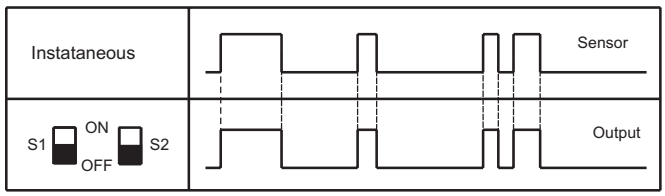


Programming

The unit has a set of five dipswitch key (installed in the box side) for programming the operation mode and the kind of delay, besides the required time range selection.
For making the adjustment easier, the instrument has a led, set up on the front panel that indicates the output relay activation.

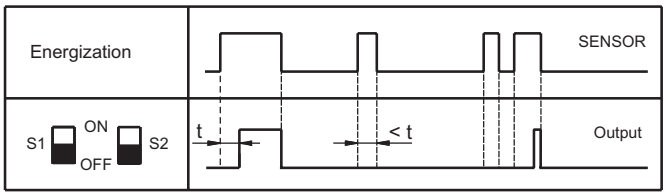
Instantaneous

On this way, the output relay instantly signals the light beam interruption. Recommended for applications where the unit must inform the presence or passing of an object in real time.



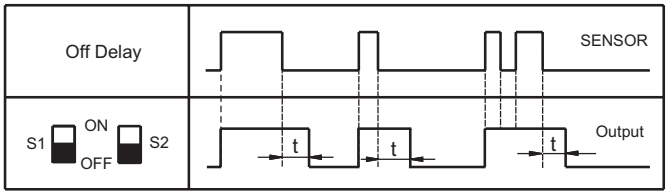
On- Delay

The on-delay provides a delay on the powering the output relay, in relation to the sensor activation. Recommended for eliminating sensor false activations, besides the control functions.



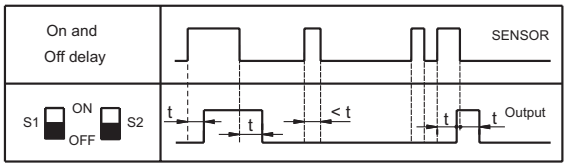
Off- Delay

In the off-delay, the activation of the output relay is extended in relation to the sensor, making it recommended for the sensor quick activation situations.



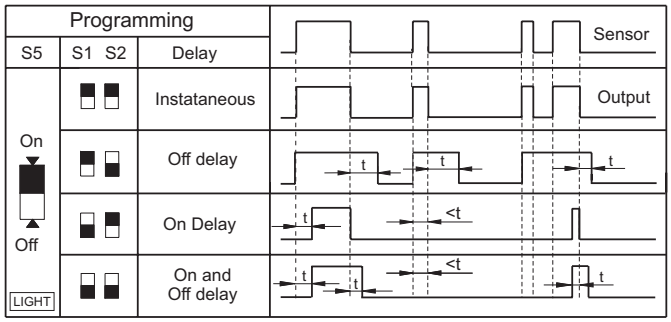
On-Delay and Off-Delay

This a combination of both previous functions, the adjusted time is the same for both delay.



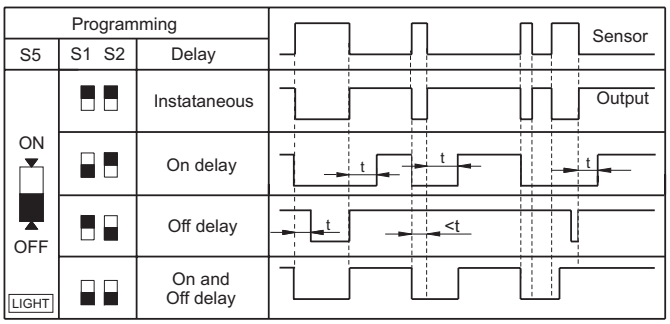
Dark Mode

This way, the output relay is kept de-energized and when the object to be detected cuts the beam light, the relay is energized.



Light Mode

This inverts the output, it means, the relay is kept energized and when the object breaks the beam light, the relay is de-energized.



Time Range

The delay time can be within 0 to 60 seconds, divided in 3 programmable range, as shown on the chart.
The time within the selected range is adjusted in the potentiometer (P2) set up on the front panel.4
It is required to use the least possible time range to get most accuracy on the delays, for instance, energization time of 5s, it is necessary to adopt the 0 to 6s range.

Range	Time	S3 S4
A	0 to 0.6s	On / Off
B	0 to 6s	On / Off
C	0 to 60s	On / Off

Technical Features

Power Supply

Operating voltage	110 or 220Vac
Tolerance	±10%
AC frequency	50/60Hz
Consumption	2VA

Input Circuit

Field device	TO/RO-8H TO/RO-12H
Time range	A - 0 to 60s B - 0 to 6s C - 0 to 0.6s
Function delay	on-delay off-delay on-delay/off-delay
Operating mode	light/dark
Programming	dip switch

Output Circuit

Type	relay
Contacts	1 DPDT
Max. switching power	4A/250Vac
Response time	10ms

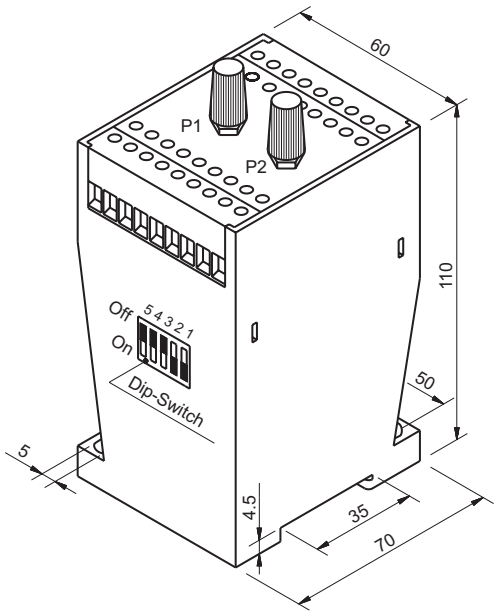
Housing

Type	plastic box (DIN)
Mounting	rail 35mm (DIN46277)
Material	ABS
Ambient temperature	-20°C to +60°C
Protection class	IP30
Weight	415g

Mechanical Construction

Set up in ABS molded plastic boxes, to be mounted up on 35 mm (DIN 46277) rail or by two screws (DIN 43604).

Mechanical Dimensions



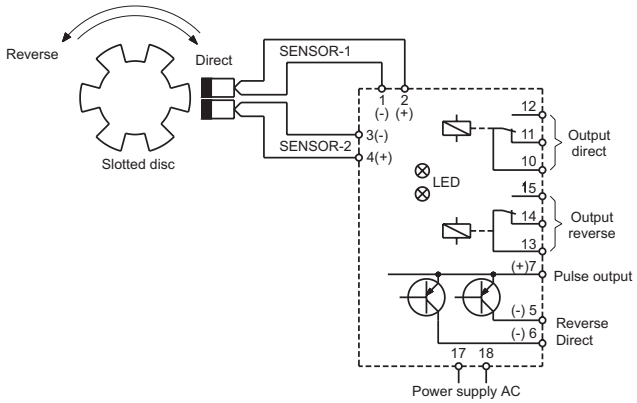
Rotation Direction Detector
KMV-235/110-220Vac

Applications

This unit has the purpose of detecting the moving direction on engines, reducers, fans, elevators, mills, mixers, etc.

It uses two Namur inductive sensors, providing pulses for the control unit, which controls the moving direction.

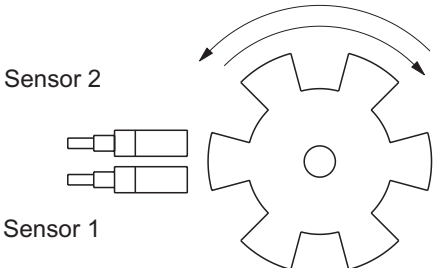
Connections Diagrams



Reverse and Direct output

The direct output which is formed by one relay with a SPDT reversible contact, is activated when the moving direction is a clockwise, operation signalized by a red led on the front panel.

Analogously in anti-clockwise moving, the reverse relay is also activated, with their led, making the direct relay to be immediately deactivated.



Pulses Output

The output stage is composed by two open collector transistors, able to command electronic circuits or PLC I/O input card.

When the rotation sense is direct, the pulses output will supply a pulse every time that a came passes through the sensors, being established that the frequency signal is proportional to the axis speed. Analogously, the reverse output also transmits the pulses when the rotation is anticlockwise moving.

Technical Features

Power Supply

Operating voltage	110 or 220Vac
Tolerance	±10%
AC frequency	50/60Hz
Consumption	3VA

Input Circuit

Sensor 1	Namur
Sensor 2	Namur
Operating voltage	8Vcc±5%
Current consumption	I≥3mA (deactivated) I≤1mA (activated)

Relay Output

Direct output	SPDT relay
Reverse output	SPDT relay
Max. switching power	4A/250Vac

Pulses Output

Type	PNP transistor (open collector)
Max. output voltage	30Vdc
Max. output current	200mA

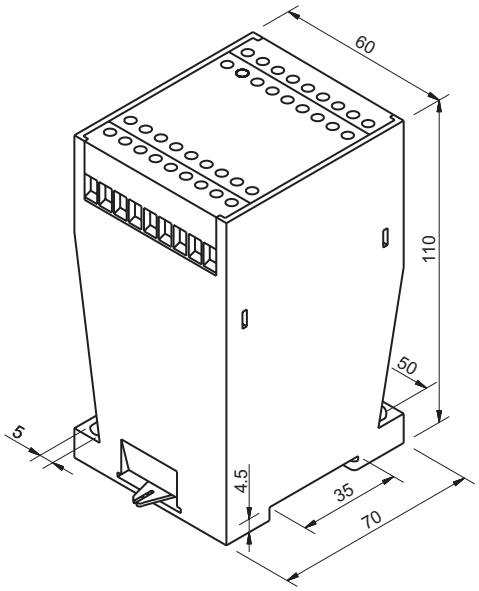
Housing

Type	plastic box (DIN)
Mounting	rail 35mm (DIN46277)
Material	ABS
Ambient temperature	-20°C to +60°C
Protection class	IP30
Weight	415g

Mechanical Construction

Set up in ABS molded plastic boxes, to be mounted on 35 mm (DIN 46277) rail or by two screws (DIN 43604).

Mechanical Dimensions



Monitoration and Transduction of Speed and Rotation

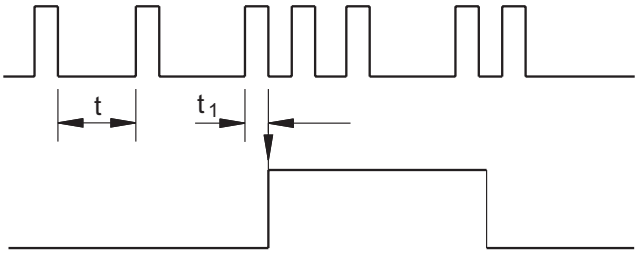
During industrial process automation we have many control applications and speed monitoration in rotative equipment such as: engines, reductors, pumps, fans, mixers, mills, etc. We can find two most frequent controls:

Speed Monitoration

In this application an inductive proximity sensor is usually used and it is installed together with the monitored axis, detecting the passing of a metallic came or the relieves of an indented disc.
Thus, the sensor generates a pulsed signal with proportional frequency to the monitored axis rotation. The signal is transmitted for the Speed Monitor that compares the time between two pulses with a previous determined time, commanding this way the output stage.

Proximity Sensor

Pulses generated by the sensor

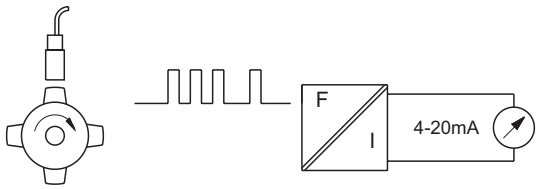


Speed monitor output signal

The inductive proximity sensors used for this purpose usually have a Namur sensor that can reach higher response in frequency and can transmit current signals which are immune to electro magnetical interferences. Although, the NPN and PNP sensors can also be used.

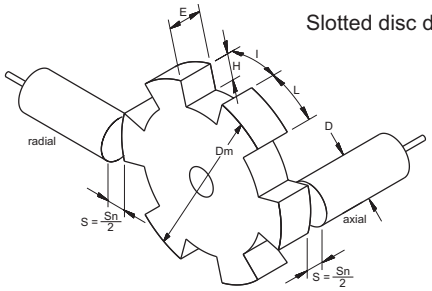
Speed Transductor

It converts the sensor pulsed signal into analogical current signal (4-20mA) proportional to monitored axis rotation.
The analogical current signal is useful to act rotation indicators, speed controllers, etc.



Slotted Disc Construction

The slotted disc construction is internationally standardized as the inductive proximity sensors require it to determine the response in frequency.
Below we can see the set up of the sensors in the disc as well as the least dimensions:



Slotted disc diameter calculation

$$Dm = \frac{L + I}{\pi} N$$

Disc dimensions

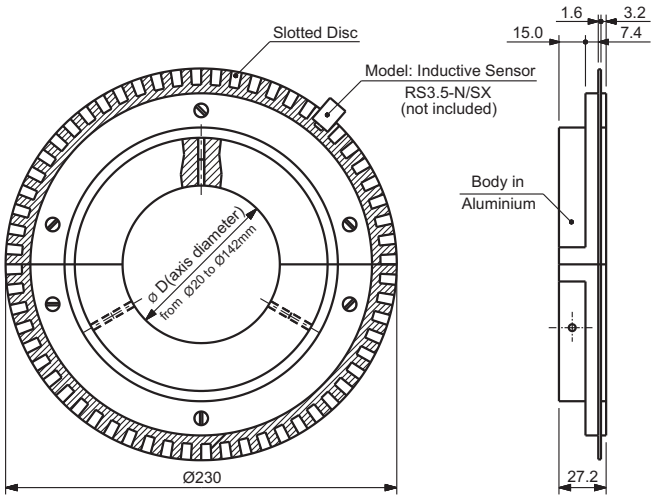
$$L = E = D \quad I = 2xL$$

Sensor frequency calculation

$$F = \frac{RxN}{60} \leq fmáx \ \ do \ \ sensor$$

Where: R= number of rotations per minute
N= number of tooth in the disc

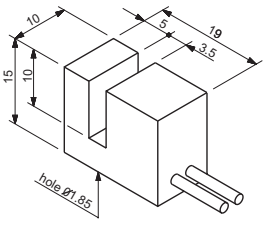
Model: RD60-230/FXXX-Bi



Slotted Disc

The slotted disc showed here is a 60 tooth model, easy to install because it is bi-parted, it means, divided in two parts in order to make the axis set up easy. Its application is recommended to monitor low rotation axis; it must be used together with an inductive proximity sensor with “U”slot shape.

Model: RS3.5-N/SX



Note: In the slotted disc codification it is required to specify the tooth quantity (RD3/RD6/RD15/RD15/RD60) and the axis diameter (20 to 140 mm), changing the letters XXX by the diameter in mm.

EG: RD60-230/024-Bi for a 24mm diameter axis and 60 tooth.

Speed Monitor
KMV-333/110-220Vac

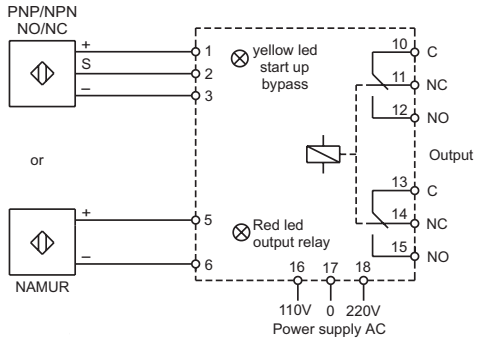
Applications

Developed to monitor equipment halt, stop or speed increase, such as engines, reductors, fans, mixers, transporters, mixers, etc.

Proximity Sensor

The speed transductor has the purpose of converting the mechanical moving (rotation, oscillation, etc) into an electrical signal that can be interpreted by the moving monitor. It is usually done by an inductive proximity sensor.
This equipment has input for the most common sensors: NPN, PNP and Namur.

Connections Diagram



Overspeed

This function is programmed by positioning the S1 key on the ON position, being regularly used to detect speed increase situations, for instance: in conveyors lines, bumps, etc.
The output stage of the unit is composed by a relay with two revertible contacts (DPDT), being indicated by a red led set up in the front panel of the unit.
A fault condition that makes the output relay to be de-energized, it happen every time when the speed surpasses the previously programmed value.

Underspeed

Used to detect uncommon situations in rotative equipment, such as mixers, pumps, etc, beside it is used to detect axis breaks in engines, reductors, fans, etc.
Thus, which is gotten by positioning the S1 key on OFF position, the output relay is switched off when the speed falls down under the previous programmed value, returning being powered, when the speed increases again.

Start up Bypass

When selecting the underspeed function, the start up bypass circuit is automatically activated; it has the function of holding the instrument work, keeping the output relay powered until the controlled equipment passes through the initial inertia and reaches the usual operation speed. This timing is signalized by a green led set up in the front panel of the instrument.
This inactive period is called start up bypass timing and can be adjusted within 1 to 30 seconds range, through a potentiometer installed in the box side face, next to the setting keys, being empirically determined to each controlled equipment.

Local Reset

The start up bypass timing is activated when the equipment is being powered, and it is also possible, to activate it later through a reset button mounted in the front panel.
With the local reset button pressed, the output relay keeps powered, after being released (contact opening) the start up bypass timing counting starts and just later it releases the output relay.

Remote Reset

It is also possible to activate the reset through an external control circuit or an external pushbutton (impulse NO contact) through 8 and 9 terminals, working as same as local reset.

Operation Range

The unit can operate with 6 to 6000rpm (or movements within 0,01 to 10 seconds period) divided in three programmable ranges, through S2 and S3 keys, as we can see in the chart below:

Range	Rotation	S2 S3
A	600 to 6000 rpm	on / off
B	60 to 600 rpm	on / off
C	6 to 60 rpm	on / off

Choosing the range

The chart above shows the detection rotation, that can not be confused with the equipment nominal rotation. E.G.: an equipment operating with rotation until 3200 rpm and it is wished to detect that the speed falls down under 20 rpm, it requires C range.

Important the chart above shows the rotation considering only one pulse per rotation; if an slotted disc is applied, it is required to calculate the speed taking the number of tooth in the wheel.

If in the previous case, the axis had 6 cams, the detection rotation would pass from 20 to 6 x 20, making 120 rpm, therefore we should use the B range of the instrument. This way, we can also use the equipment for rotations under 6rpm, simply by suppling a pulse number enough for being in one of the ranges.

Speed adjustment

Having the appropriate rotation range determined, it is required to adjust the rotation within the range, working in the speed potentiometer mounted in the front panel. In the previous example, for a detection speed of 20 rpm with 06 pulses it is required to use the B range (6o to 600 rpm), setting the S2 keys on the ON position and S3 on the OFF position and adjust the 120 rpm in the frontal potentiometer.

Response Time

The response time is the time required for the unit to detect the overspeed or the underspeed and it is calculate with the formula below. It is important to remind that the bigger is the number of pulses supplied, the lesser will be the time needed to indicate the fault condition in the monitored equipment speed.

$$t = \frac{60}{R \times N}$$

being:

t - response time in seconds
R - speed in rotations per minute
N - number of pulse per rotation
(it means the number of cams)

In the example we have:

$$t = \frac{60}{R \times N} = \frac{60}{20 \times 6} = 0.5s$$

Memory Function

It is implemented by setting the S4 key on the ON position. It has the function of blocking the output relay when some irregularity happens, thus forcing the operator to reset the unit by the pushbutton or by the external reset.

Programming

The chart below summarizes the programming keys positions according to the required functions.

Speed Monitor		
Operation Mode S1	Time Range S2 S3	Memory S4
on / off Overspeed	on / off A-600 to 6000rpm on / off B-60 to 600rpm on / off C-6 to 60rpm	With Memory on / off Without Memory
on / off Underspeed		
Star Up Bypass 1 to 30s	Speed Adjustment P2	Reset Local Remote

Technical Features

Power Supply

Operating voltage	110 or 220Vac
Tolerance	±10%
AC frequency	50/60Hz
Consumption	2.5VA

Input Circuit

Field device	proximity sensors (NPN, PNP or Namur)
Minimum pulse duration	0.5ms
Minimum pulse interval	0.5ms
Operating range	A - 600 to 6000rpm B - 60 to 600rpm C - 6 to 60rpm
Operating mode	underspeed or overspeed
Start up bypass timing	adjustable from 1 to 30s local or remote reset
Memory function	programmable

Output Circuit

Type	relay
Contacts	1 DPDT
Max. switching power	4A/250Vac

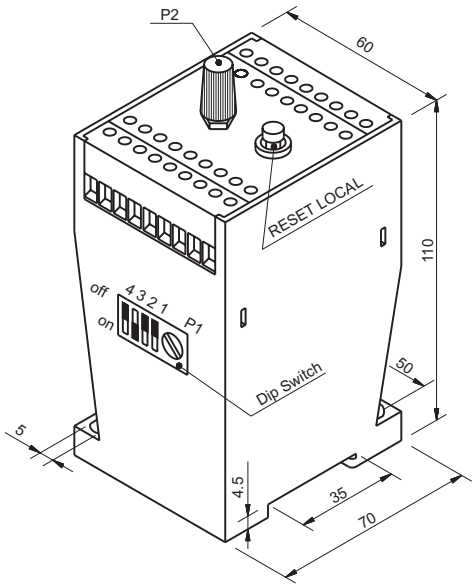
Housing

Type	plastic box (DIN)
Mounting	rail 35mm (DIN46277)
Material	ABS
Ambient temperature	-20°C to +60°C
Protection class	IP30
Weight	415g

Mechanical Construction

Set up in ABS molded plastic boxes, to be mounted up on 35 mm (DIN 46277) rail or by two screws (DIN 43604).

Mechanical Dimensions



Speed Transductor:
KMV-228/110-220Vac
KMV-229/110-220Vac

Applications

The speed transductors series are frequency/current convertors, it means, they transform the pulsed signal coming from a proximity sensor in an analogical signal with a current proportional to the monitored axis speed.

This way, the equipment can be used for rotation measurement, advance, etc.

Proximity Sensor

This unit has an input for the Namur proximity sensors, which have higher response in frequency and transmit immune current signals to electro magnetical interferences.

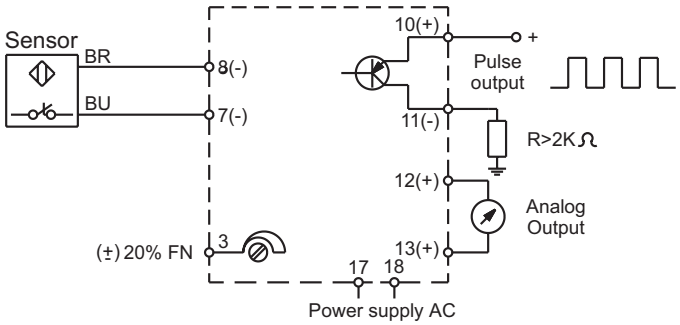
KMV-228/110-220Vac

This model has an analogical output in current in the 4-20mA range, that can be converted into 1-5V voltage signal, only adding a 250 Ω resistor.

KMV-229/110-220Vac

This model has an analogical output in current in the 0-20mA range, that can be converted into a 0-5V voltage signal, only adding a 250 Ω resistor.

Connections Diagram



Pulse Output

The instrument has a pulse output that has the objective of repeating the sensor pulsed signal.

This output amplifies and repeats the signal, keeping the width and the break between the pulses unchanged.

The output is an open collector, allowing that voltages until 30V can be connected to the transistor emitter (terminal 10) and it supplies as output terminal 11, that can be directly connected to electronic circuits, controllers, totalizers, digital systems, PLC, etc.

Operation Frequency

The operation frequency must be determined according to the most speed the controlled equipment can reach. If an equipment works within the range of 200 to 320 rpm, with an slotted disc of 60 tooth, we can calculate the operation frequency as showed below:

being:

$$F = \frac{R \times N}{60}$$

F - operation frequency
R - speed in rotations per minute
N - number of pulses per rotation
(it means the number of cams)

$$F = \frac{R \times N}{60} = \frac{320 \times 60}{60} = 320Hz$$

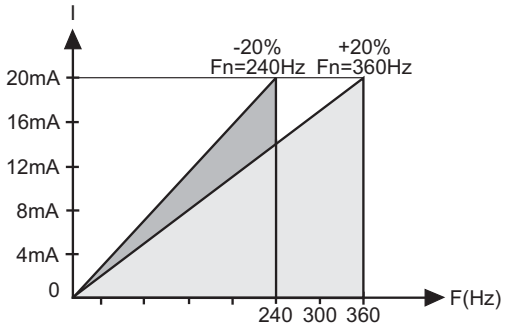
Nominal Frequency

It is the frequency in which the instrument is calibrated in the factory and must be rigorously chosen, according to the available models, as shown in the chart below:

Maximum Frequency (Hz)	Nominal Frequency Fn (Hz)
40 to 60	50
56 to 84	70
80 to 120	100
120 to 160	140
160 to 240	200
240 to 360	300
320 to 480	400
400 to 600	500
480 to 720	600
560 to 840	700
640 to 960	800
720 to 1080	900
800 to 1200	1000

Span Adjustment

There is a potentiometer set in the front panel, that enables the span adjustment, it means the nominal frequency (Fn) can be adjusted more or less ±20%.
In the previous example, it is required to take Fn=300Hz, because the most frequency is 320Hz and the instrument allows an adjustment within the range 240 to 360 Hz.



Instrument Calibration

The instrument calibration is important for the equipment perfect working and it can be executed in two ways:

In the equipment

By connecting the proximity sensor and an current measure equipment in the transductor output.
Afterwards, the equipment must be started, controlled on the top speed (in our example 320rpm) and the adjustment must be proceed in the Span potentiometer, until the output shows 20mA.

In the Lab

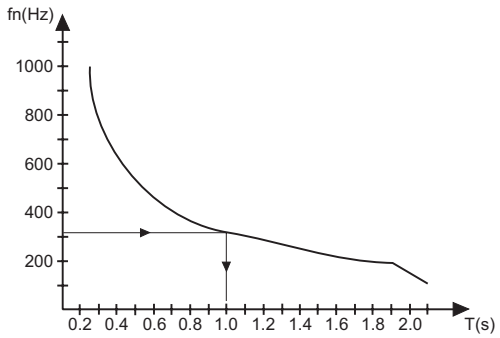
By connecting a function generator replacing the sensor (8Vpp squared wave), adjust its frequency according to the top speed, in our example it is 320Hz (320rpm/60tooth).
Afterwards, the instrument is powered, the current measure equipment connected and the adjustment must be proceed through the Span potentiometer until the output shows 20mA. Afterwards, it is required to check the linearity as shown in the side chart.

Frequency	Output Current
320Hz	20mA
240Hz	16mA
160Hz	12mA
80Hz	8mA
0	4mA

Response Time

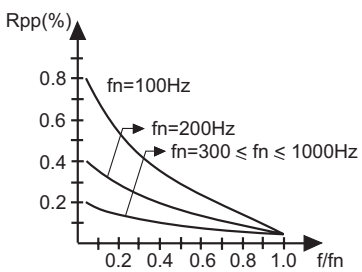
It is the required time for the output signal to reach 95% of the final value when the frequency is suddenly changed. This time varies according to the specified Fn (please see the chart below).

In the example given, the time that the instrument takes to indicate a variation from 0 to 320Hz is 1 second.



Output Ripple

The equipment generates a ripple over the analogical output signal. This ripple varies according to the Fn specified, keeping constant for the Fn over 300Hz.



Technical Features

Power Supply

Operating voltage	110 or 220Vac
Tolerance	±10%
AC frequency	50/60Hz
Consumption	3VA
Operating voltage	8Vcc±5%
Current comsuption	I≥3mA(deactivated)
	I≤1mA (activated)

Input Circuit

Field device	Namur sensor
Nominal frequency	see table
Span adjustment	±20%Fn

Analogic Output

KMV-228/..	4-20mA
KMV-229/..	0-20mA
Operating voltage	24Vdc
Max. load impedance	850Ω
Output at over frequency	27mA ±10%
Accuracy	20μA
Linearity	±1%

Pulse Output

Type	PNP transistor (open collector)
Max. switching voltage	30Vdc
Max. output current	200mA

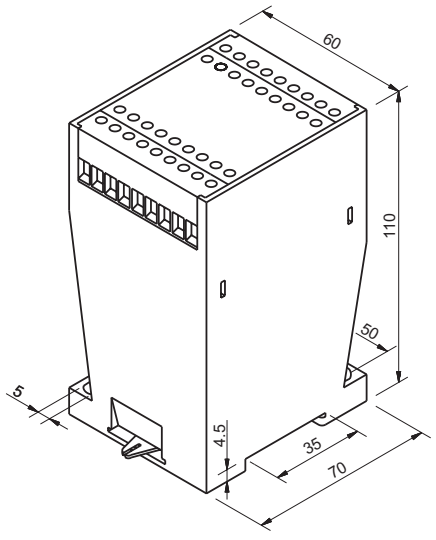
Housing

Type	plastic box (DIN)
Mounting	rail 35mm (DIN46277)
Material	ABS
Ambient temperature	-20°C to +60°C
Protection class	IP30
Weight	415g

Mechanical Construction

Set up in ABS molded plastic boxes, to be mounted on 35 mm (DIN 46277) rail or by two screws (DIN 43604).

Mechanical Dimensions



Indicator Speed Monitor
KMV-400/110-220Vac

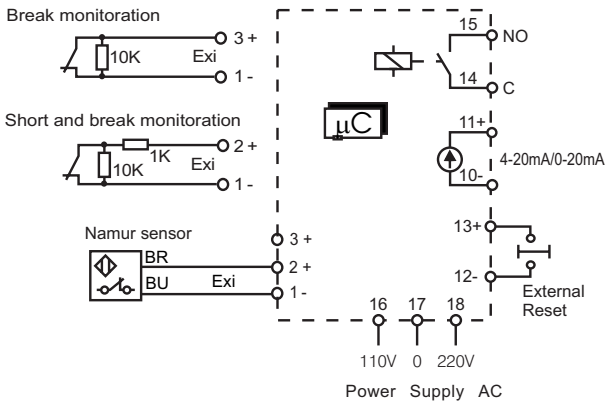
Applications

The instrument monitors and indicates the rotation of equipments, such as: engines, reductors, fans, mixers, etc.
Specially recommended for equipment operating in low and high speed, because there is a powerful micro controller in the instrument, able to monitor rotations from 0,001rpm to 1000Hz.

Display

The monitor has a display 3 ½ digits, composed by leds of 07 high visibility segments that can be programmed to indicate the rotation of the monitored equipment in rpm, mA, Hz and %.

Connections Diagram



Actuation Methods

For the conversion of the axis mechanical movement into a pulsed electric signal that can be interpreted by the monitor, it is required a Namur inductive sensor.

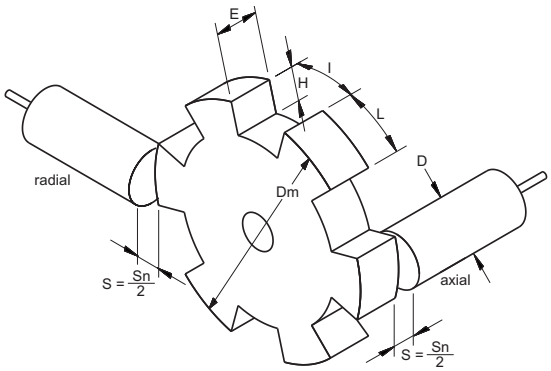
The sensor detects the passage of a metallic target that can be: a cam, axle, screw, etc, or even a slotted disc.

It is also possible to use traditional mechanical sensors or reed switch to supply pulses proportionally to the monitored equipment speed.

Slotted Disc Construction

The construction of a slotted disc is internationally standardized as the inductive proximity switches require it to determine the frequency response.

Below we can see the sensors setting up in the disc , as well as their least dimensions:



Slotted disc diameter calculation

$$Dm = \frac{L+I}{\pi} N$$

Disc dimensions

$$L = E = D \quad I = 2xL$$

Sensor frequency calculation

$$F = \frac{R \; x \; N}{60} \leq f \; \max sensor\; frequency$$

where: R= number of rotations per minute
N= number of tooth in the disc

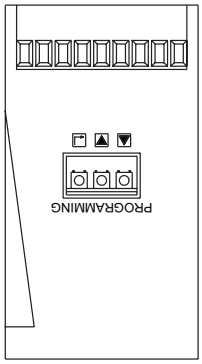
Note: Optionally the instrument can be supplied with input for PNP or NPN sensors.

Output Relay

The instrument has a relay output, with programmable contact and capacity to activate the contactor of the monitored equipment.

Configuration

All adjustments and programming are executed through three keys installed in the side of the monitor, protected by an transparent cap. The configurations are made with the display support in a simple and easy sequence.



Programming Sequence

To have the configuration started keep simultaneously both UP▲ and DOWN ▼ keys until the display shows the word CONF blinking.

The figure on the 4th page shows the calibration sequence where pressing the UP ▲ or DOWN ▼ keys we pass through the options for the approached item and when pressing the ENTER ↵ key, the required option id memorized, going on to the next option until all of them are memorized, returning to the operation way.

Note: Please observe that the displays makes a check every time the instrument is powered.

Analogic Output

The monitor still has an analogous output (0-20mA or 4-20mA) proportional to the monitored rotation, it can be used as feedback to the controller.

For programming it, press the ENTER ↵ key and observe that the display blinks showing the OUT 4-20 mA option, for accepting, press ENTER ↵ , or use the UP ▲ or DOWN ▼, keys for OUT 0-20 mA.

For returning to the previous option, it is required to always use the UP ▲ or DOWN ▼, keys, recording the required option with the ENTER ↵ key.

Speed Calibration

We should now inform how the mechanical movement is being converted into pulses, informing to the monitor:

- Number of tooth of the in slotted disc
- Unit used
- Monitored equipment most rotation
- Display decimal dot

The display shows CONF blinking, then press the ENTER ↵ key.

Slotted Disc

Inform the number of tooth of the in slotted disc or of the cams that moves the sensor (from 01 to 60).

Observe that the first digit is blinking, select the required value through UP ▲ or DOWN ▼, then go on to the next digit with the ENTER ↵ key.

Configure this digit with the UP ▲ or DOWN▼, memorizing your selection with ENTER ↵ key.

Unit Used

Define now the unit used pressing UP ▲ or DOWN▼, checking the indication in the display and memorize your choice with ENTER ↵ key.

Most Rotation

Inform the most rotation which is expected for the monitored equipment, observing the selected unit.

Please notice that the first digit is blinking, requiring configuration through UP ▲ or DOWN▼ , going on to the next digit with the ENTER ↵ key.

Decimal Dot

Repeat this procedure for the other three digits and observe that the digit that holds the decimal dot starts blinking.
Set the decimal dot on the correct digit with the UP ▲ and DOWN ▼, keys and press the ENTER ↵ key for memorizing the adjustment, observe that the displays shows CONF, then press the ENTER ↵ again.

Operation Mode

Use the UP ▲ or DOWN ▼ ,to determine the requested operation way and memorize your selection through ENTER ↵ key.

SOB: where the output contacts signalize overs peed in relation to Set Point that will be stored afterwards.
SUB: in this option the contact will show the underspeed in relation to the Set Point.
JA: where the contact will show that the speed is between both over and under limits.

Set Point

The first digit starts blinking, configure it through UP ▲ or DOWN ▼, and press ENTER ↵ to go on the next digit.

Repeat this procedure for the other digits, observing that the decimal dot will be adopted in the last position.
The set point is configured in a different way for it operation way, as shown:

SOB - Overspeed Set Point

Inform the rotation in which the output relay should be de-energized, it means the speed over this value rings the alarm.

SUB - Underspeed Set Point

Speed under the adjusted value will make the output relay to be de-energized.

JA - Window Set Point

The instrument will request two rotation values in which the output relay will be powered when the monitored equipment speed reaches this programmed break.
The first value to be defined is the high alarm (hi) that must be higher than the second value the low alarm (low), otherwise the alarm will be permanently activated.

Initial Timing

In the window and under speed mode it is still necessary to define the start up bypass, that has the function of blocking the alarm relay during the monitored equipment starting, in order to make it surpass the initial inertia and reaches the regular operational speed.

To select the time among 30, 60 and 90 seconds, use the UP ▲ or DOWN ▼, memorizing their value with the ENTER ↵.

External Reset

If the equipment monitored require a greater delay for its start up the external reset input must be kept closed for the desered time.
To repeate the set delay it is necessary just to send pulses, closing the external reset input.

Alarm Memory

It has the function of blocking the alarm relay in case of irregularity, requesting a reset command through the external impulse button connected to monitor terminal 12 and 13.

This function is specially recommended where the process must be identified after the alarm activation. To select this option press the UP ▲ or DOWN ▼ keys, memorizing the requested option with the ENTER ↵ key.

Observe that the display shows *OFF* for the off memory mode and *ON* when it is selected.

Alarm Contact

The output relay can be configured for getting the alarm contact regularly NO or NC open, configuring it through UP ▲ or DOWN ▼, keys finishing with the ENTER ↵ key.

Observe that the instrument leaves the configuration mode, returning to the operation mode and if it is necessary to reprogram some items it is requested to enter the configuration mode again.

Indication

The display shows the equipment instant speed in four ways:

RPM: rotation per minute
Hz: cycle per second
%: instant speed percentage in relation to the programmed Set Point demanded value .
MA: proportionally to configurated most speed.

The indication mode selection can be configured by pressing the UP ▲ or DOWN ▼, observing the unit on the display right side, finishing with the ENTER ↵ key for its memorization, *OH* will be displayed indicating that all setting are storage.

Note: The display shows blinking if the input pulse frequency is bigger than the most adjusted rotation during the calibration process.

Indicators

On the display left side there are three leds of signaling.

IN: keeps blinking while the monitor is receiving pulses from the sensor.
ALM: for signaling the break or short-circuit in the interconnection cable with the sensor.
OUT: signals the output relay energization.

Mechanical Construction

Set up in ABS molded plastic boxes, to be mounted up on 35mm (DIN 46277) rail or by two screws (DIN 43604).

Technical Features

Power Supply

Operating voltage	110 or 220Vac
Tolerance	±10%
AC frequency	50/60Hz
Consumption	< 3.5VA

Input Circuit

Input signal	on/off
Field device	Namur sensor or mechanical contact
Operating voltage	8Vdc ±5%
Max. frequency	1KHZ
Minimum pulse duration	0.4ms

Operation

Display function (programmable)	%, Hz, rpm, mA
Range	0.001Hz - 1000Hz or 0.001rpm - 9999rpm
Number of tooth (slotted disc)	1 to 60
Max. axis speed (programmable)	1.000 to 1000Hz or 1.000 to 9999rpm
Operating mode (programmable)	under/over/window
Start up bypass timing (programmable)	30, 60 or 90s
Reset	external pushbutton
Memory function	programmable

Analogic Output

Current (programmable)	4-20mA or 0-20mA
Minimum voltage	12Vdc@800Ω
Output current in over speed	20mA
Accuracy	11uA
Linearity	0.5%

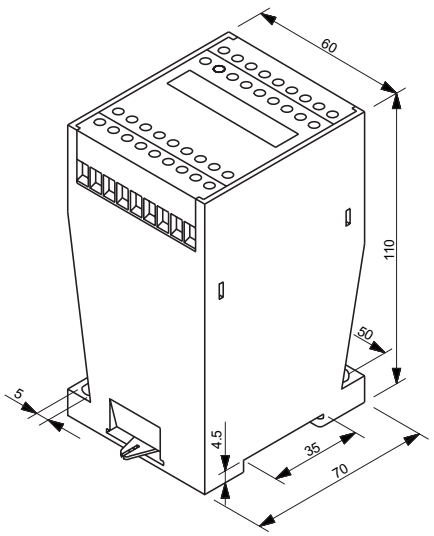
Relay Output

Contacts	1-SPDT
Programmable function	NO or NC energized de-energized
Max. switching power	4A/250Vac
Response time	<10ms

Housing

Type	plastic box (DIN)
Mounting	rail 35mm (DIN46277)
Material	ABS
Ambient temperature	-20°C to +70°C
Protection class	IP30
Weight	415g

Mechanical Dimensions



CONFIGURATION MODE:

CONFIGURATION