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SPC1-AP6X / SPC1-AN6X

Programmable pulse or interval counter

- Direct adaptation between sensor and connecting cable
- Counting of pulses or intervals
- Simple setting by external teach-input
- No additional wiring required
- Counting range from 0 to 65535
- Switching amplifier up to 400 mA
- N.C./N.O. inverter



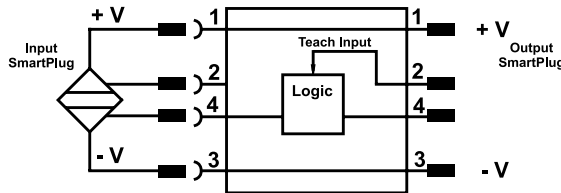
The SPC1 SmartPlug is a freely programmable counter for the direct adaptation to sensors with a standardized M12x1 connection.

The SPC1 SmartPlug is available in 2 versions:

- PNP input - PNP output SPC1-AP6X (for use with PNP sensors)
- NPN input - NPN output SPC1-AN6X (for use with NPN sensors)

Connection:

The SmartPlug is very easy to connect; it is plugged onto the M12x1 connector of a sensor and the connecting cable is connected to the other side of the SmartPlug. The sensor configuration has to meet the standards (1 +V (BN) 3 -V (BU) 4 output (BK)).

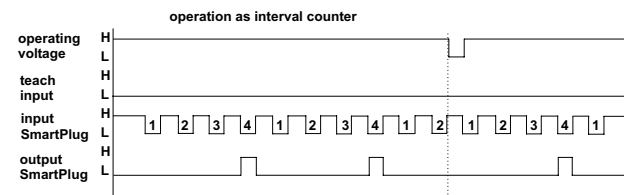
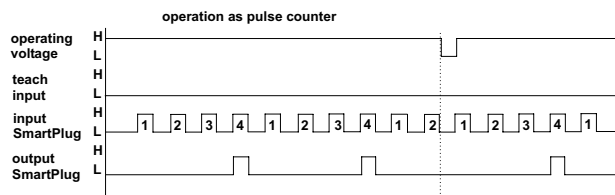
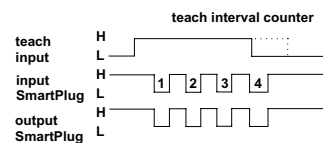
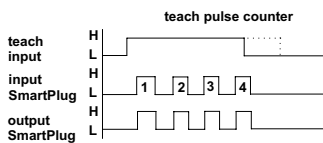


Setting:

The setting of the preset number is made by using the signals "teach input" and "input SmartPlug". If for example, 4 pulses have to be counted, the setting can be made as follows (operating voltage being switched on):

1. Connect teach input with +V.
2. Actuate the sensor 4 times (= 4 pulses) - The SmartPlug recognizes automatically 4 pulses at the "input SmartPlug".
3. Disconnect teach input from +V → READY.

After this setting, the output of the SmartPlug is activated every fourth pulse. The setting is maintained when the sensor is switched off.



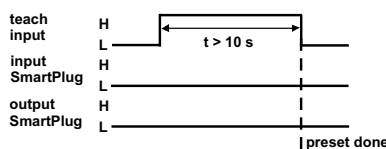
H = input or output active; L = input or output inactive

When switching on the operating voltage, the counting procedure is reset. The initial state of the preset number is 1 (pulse counter).

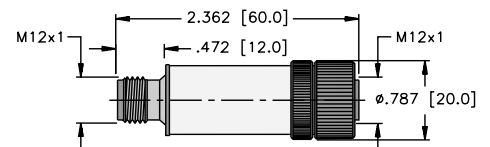
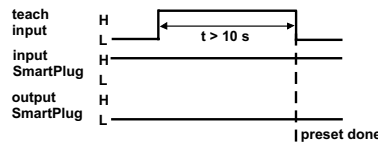
Technical Data

Operating Voltage	10-30 VDC, residual ripple of max. 10%	Display:	Red LED
Own Current Consumption:	<10 mA	Housing Material:	Plastic PBTP/PA
Input Resistance:	>10 kΩ	Protection Standard:	IP 67
Max. Input Frequency:	10 kHz	Dimensions Inches[mm]:	See diagram
Min. Response Time:	0.1 ms	Connection Input:	4-pin socket M12x1
Max. Output Current:	400 mA short-circuit proof	Connection Output:	4-pin connector M12x1
Ambient Temperature Range:	0° to +60°C (+32° to +140°F)	Weight:	15 g
Storage Temperature Range:	-20° to +60°C (-4° to +140°F)		

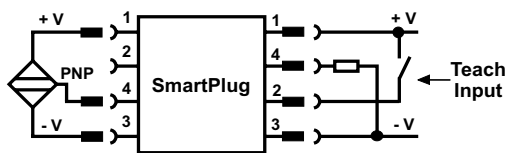
Preset to factory setting 1 pulse counter



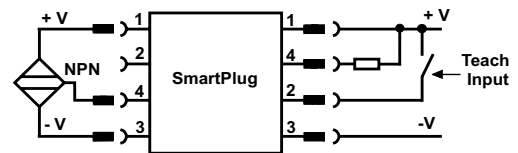
or



SPC1-AP6X



SPC1-AN6X



Application Examples:

- Gearwheel/Divider: On a gearwheel with 100 teeth, one pulse per rotation is to be measured.
 - A suitable sensor with standardized M12x1 connection is mounted in a way that each tooth is safely recognized.
 - A SmartPlug SPC1 is connected between sensor and sensor connecting cable.
 - The preset number 100 is taught into the SmartPlug, → connect "teach input" with +V, turn round the gearwheel exactly one time.
 - Disconnect "teach input" from +V. READY

At the output of the SmartPlug, one pulse per rotation is measured.
- Counting parts: Bulk material is filled into cartons by means of a conveyor belt. The task is to specify the exact number of parts required to fill up the carton.
 - A suitable sensor with standardized M12x1 connection is mounted in a way that all parts are safely recognized.
 - A SmartPlug SPC1 is connected between sensor and sensor connecting cable.
 - A "teach input" stays connected to +V until the desired number of parts has passed the sensor (=unit the carton is full).
 - Disconnect "teach input" from +V. READY

At the output of the SmartPlug, one pulse is measured when the preset quantity of parts has been recorded; the carton is full.
- Switching amplifier: Most sensors have a maximum output current of 100 mA to 200 mA. By using a SmartPlug, the maximum output current can be increased to 400 mA.
 - A SmartPlug SPC1 is connected between sensor and sensor connecting cable.
 - The "teach input" stays connected to +V until the sensor has been actuated once (preset number 1).
 - Disconnect "teach input" from +V. READY

At the output of the SmartPlug every input pulse is measured, the output can be charged with 400 mA.
- N.C./N.O. inverter: Teach the SmartPlug as interval counter "1". An input N.C. signal will be inverted into a N.O. signal and reverse.

SPF1-AP6X / SPF1-AN6X

Programmable over or under speed monitor

- Direct adaptation between sensor and connecting cable
- Teachable speed limit
- Simple setting by external teach-input
- No additional wiring required
- Frequency range 0.015 Hz - 1 kHz
- Output load up to 400 mA



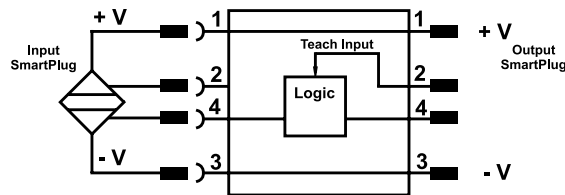
The SPF1 SmartPlug is a frequency threshold module for the direct adaptation to sensors with a standard M12x1 connection.

The SPF1 SmartPlug is available in 2 versions:

- PNP input - PNP output SPF1-AP6X (for use with PNP sensors)
- NPN input - NPN output SPF1-AN6X (for use with NPN sensors)

Connection:

The SmartPlug is very easy to connect; it is plugged onto the M12x1 connector of a sensor and the connecting cable is connected to the other side of the SmartPlug. The sensor configuration has to meet the standards (1 +V (BN) 3 -V (BU) 4 output (BK)).



Function:

The SmartPlug SPF1 observes the frequency of the signal at the pin "input SmartPlug". The output is activated if the setup frequency falls below approximately 5%.

Setting for under speed monitoring:

1. Set sensor up to sense object with SmartPlug SPF1 connected. Make sure sensor is sensing properly and output is switching.
2. Move object or set rotation to nominal speed.
3. Connect +voltage +V to "Teach Input" and then disconnect (turn off) voltage +V.
(Pulse +V to Teach Input, >1 full cycle of senses object - e.g. >1 full revolution)
4. Done, if speed or frequency drops by 5% or to 95% of the nominal speed, then SmartPlug is activated.

Setting for over speed monitoring:

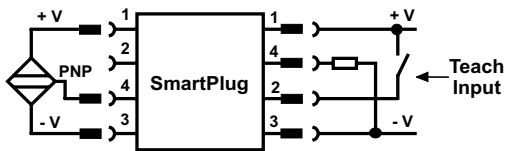
(Note: over speed output will be inverted. i.e. output activated for normal speed & output off for over speed.)

1. Set sensor up to sense object with SmartPlug SPF1 connected. Make sure sensor is sensing properly and output is switching.
2. Move object to set rotation to 106% plus X% over speed allowance of nominal speed.
3. Connect +voltage +V to "Teach Input" and then disconnect (turn off) voltage +V.
(Pulse +V to Teach Input, >1 full cycle of senses object - e.g. >1 full revolution).
4. Done. If speed or frequency goes above setpoint, then SmartPlug output goes off.

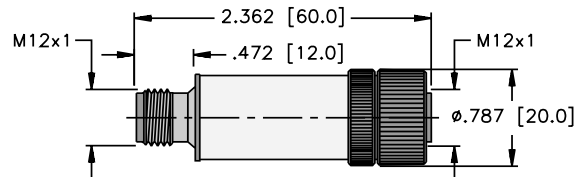
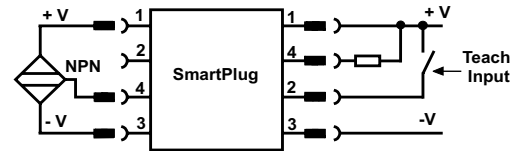
Technical Data

Operating Voltage:	10-30 VDC, residual ripple of max. 10%	Display:	Red LED
Own Current Consumption:	<10 mA	Housing Material:	Plastic PBTP/PA
Input Resistance:	>10 kΩ	Protection Standard:	IP 67
Max. Input Frequency:	10 kHz	Dimensions Inches[mm]:	See diagram
Min. Response Time:	0.1 ms	Connection Input:	4-pin socket M12x1
Max. Output Current:	400 mA short-circuit proof	Connection Output:	4-pin connector M12x1
Ambient Temperature Range:	0° to +60°C (+32° to +140°F)	Weight:	15 g
Storage Temperature Range:	-20° to +60°C (-4° to +140°F)		

SPF1-AP6X



SPF1-AN6X



Applications Examples:

1. Jam detection
2. RPM Observation
3. Conveyor built back detection
4. Cooling fan motion control

SPN1-AP6-ARN6X / SPN1-AN6-ARP6X

PNP/NPN or NPN/PNP converter, adjustable N.O./N.C. inverter

- Direct adaptation between sensor and connecting cable
- N.C./N.O. function adjustable
- Simple setting via external teach-input
- No additional wiring required
- Switching frequency up to 10 kHz
- Switching amplifier up to 400 mA



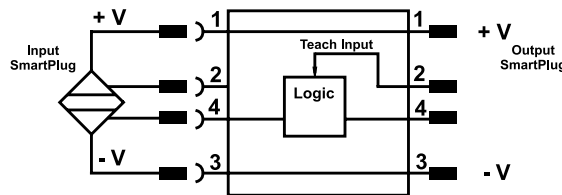
The SPN1 SmartPlug is a switching channel convertor for the direct adaptation to sensors with a standard M12x1 connection.

The SPN1 SmartPlug is available in 2 versions:

- PNP input - NPN output SPN1-AP6-ARN6X (for the conversion of PNP sensors to NPN output)
- NPN input - PNP output SPN1-AN6-ARP6X (for the conversion of NPN sensors to PNP output)

Connection:

The SmartPlug is very easy to connect: it is plugged onto the M12x1 connector of a sensor and the connecting cable is connected to the other side of the SmartPlug. The sensor configuration has to meet the standards (1 +V (BN) 3 -V (BU) 4 output (BK)).



Function:

The SmartPlug SPN1-AP6-ARN6X converts a PNP input signal into a NPN output signal. The SmartPlug SPN1-AN6-ARP6X converts a NPN input signal into a PNP output signal. Additionally the signal can be inverted (N.C./N.O. function).

Setting:

The setting of the inverting function is made by means of the signals "teach input" and "input SmartPlug"

Example:

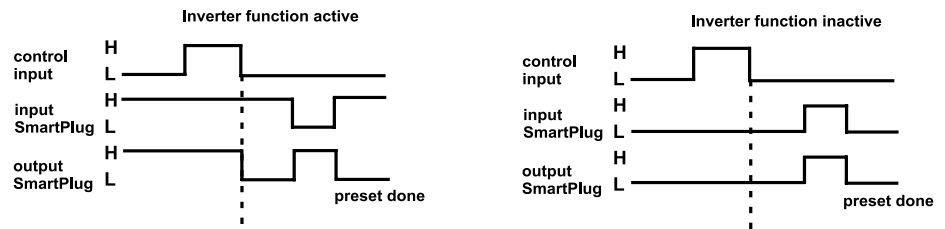
1. Setting the SmartPlug into the inverting mode:
 - a) activate sensor (output is on)
 - b) connect teach input and +V and disconnect (pulse or signal to +V). READY
2. Setting the SmartPlug into the non-inverting mode (factory setting)
 - a) inactivate Sensor (output is off)
 - b) connect teach input and +V and disconnect (pulse or signal to +V). READY

This setting is maintained when the sensor is off.

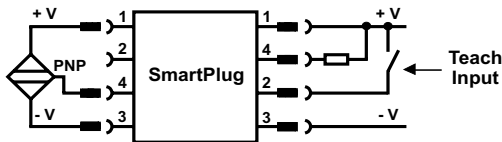
Technical Data

Operating Voltage:	10-30 VDC, residual ripple of max. 10%	Display:	Red LED
Own Current Consumption:	<10 mA	Housing Material:	Plastic PBTP/PA
Input Resistance:	>10 kΩ	Protection Standard:	IP 67
Max. Input Frequency:	10 kHz	Dimensions Inches[mm]:	See diagram
Min. Response Time:	0.1 ms	Connection Input:	4-pin socket M12x1
Max. Output Current:	400 mA short-circuit proof	Connection Output:	4-pin connector M12x1
Ambient Temperature Range:	0° to +60°C (+32° to +140°F)	Weight:	15 g
Storage Temperature Range:	-20° to +60°C (-4° to +140°F)		

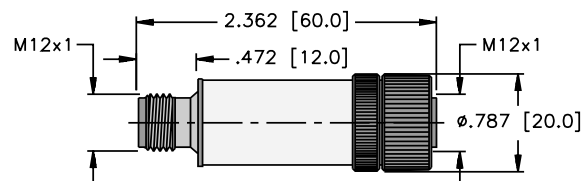
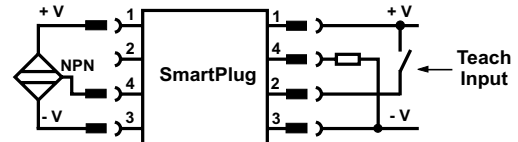
H= input/output active
L= input/output inactive



SPN1-AP6-ARN6X



SPN1-AN6-ARP6X



Function	SmartPlug	Setting
PNP / NPN converter	SPN1-AP6-ARN6X	Factory setting
NPN / PNP converter	SPN1-AN6-ARP6X	Factory setting
PNP / NPN converter and N.C. / N.O. inverter	SPN1-AP6-ARN6X	Setup: N.O. → N.C.
NPN / PNP converter and N.C. / N.O. inverter	SPN1-AN6-ARP6X	Setup: N.O. → N.C.

SPT1-AP6X / SPT1-AN6X

Programmable timer for on-delay time or off-delay time

- Direct adaptation between sensor and connecting cable
- Teachable as on-delay time or off-delay time
- Simple setting by external teach-input
- No additional wiring required
- Time range between 1 and 65535 ms (65.535 seconds)
- Switching amplifier up to 400 mA
- Can be used as pulse stretcher



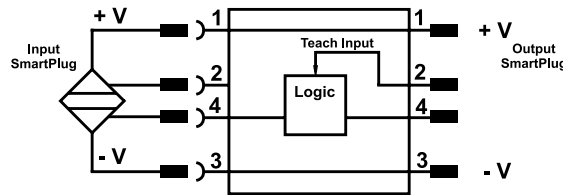
The SPT1 SmartPlug is a freely programmable timer for the direct adaptation to sensors with a standardized M12x1 connection.

The SPT1 SmartPlug is available in 2 versions:

- PNP input - PNP output SPT1-AP6X (for use with PNP sensors)
- NPN input - NPN output SPT1-AN6X (for use with NPN sensors)

Connection:

The SmartPlug is very easy to connect: it is plugged onto the M12x1 connector of a sensor and the connecting cable is connected to the other side of the SmartPlug. The sensor configuration has to meet the standards (1 +V (BN) 3 -V (BU) 4 output (BK)).

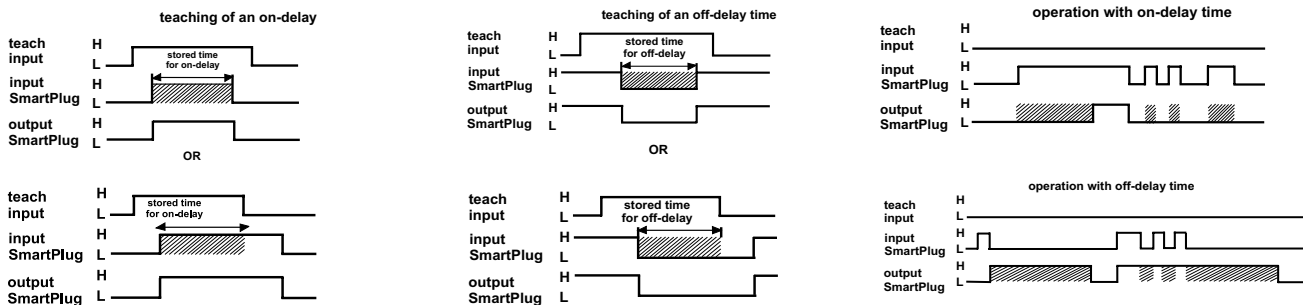


Setting:

The setting of the delay time is made by means of the signals "Teach input" and "Input SmartPlug". A delay time of 4 seconds for example can be set as follows (the operating voltage being switched on):

1. Connect teach input with +V
2. Actuate sensor for 4 seconds
3. Disconnect teach input from +V. READY

After this setting the SmartPlug has a slow operation lasting 4 seconds. This setting is maintained when the sensor is switched off.

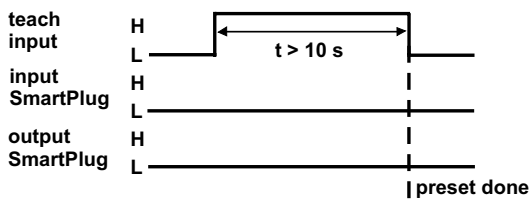


When switching on the operating voltage, the timer is reset. The initial state of the preset time is 100 ms off-delay.
 H= input/output active L= input/output inactive

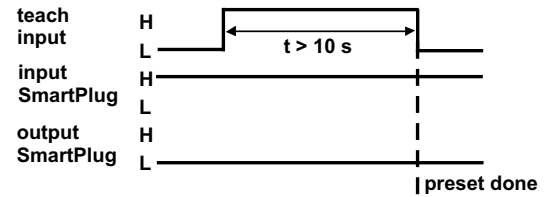
Technical Data

Operating Voltage:	10-30 VDC, residual ripple of max. 10%	Display:	Red LED
Own Current Consumption:	<10 mA	Housing Material:	Plastic PBTP/PA
Input Resistance:	>10 kΩ	Protection Standard:	IP 67
Max. Input Frequency:	10 kHz	Dimensions Inches[mm]:	See diagram
Min. Response Time:	0.1 ms	Connection Input:	4-pin socket M12x1
Max. Output Current:	400 mA short-circuit proof	Connection Output:	4-pin connector M12x1
Ambient Temperature Range:	0° to +60°C (+32° to +140°F)	Weight:	15 g
Storage Temperature Range:	-20° to +60°C (-4° to +140°F)		

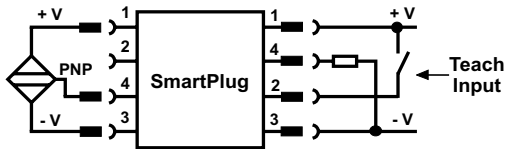
To preset to factory setting 100 ms off-delay



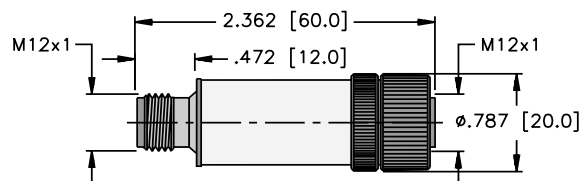
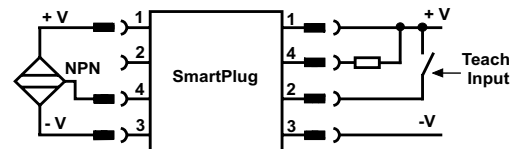
or



SPT1-AP6X



SPT1-AN6X

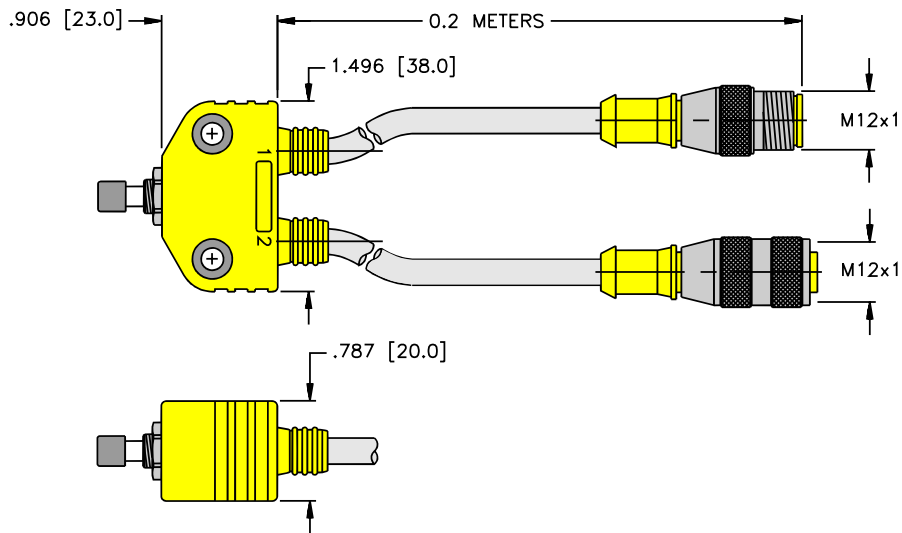


SmartPlug Programing Push Button

VB2-SP1



Dimensions



Pinouts

Female	Male
4-pin	4-pin

Wiring Diagram

