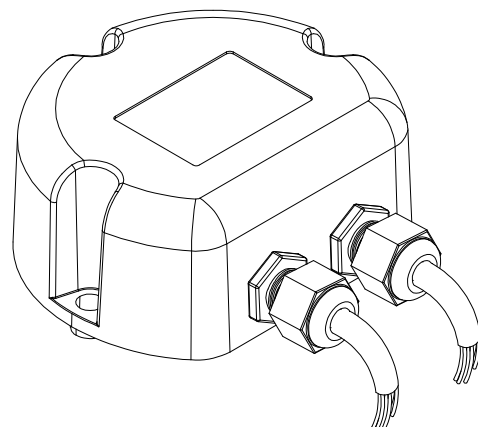
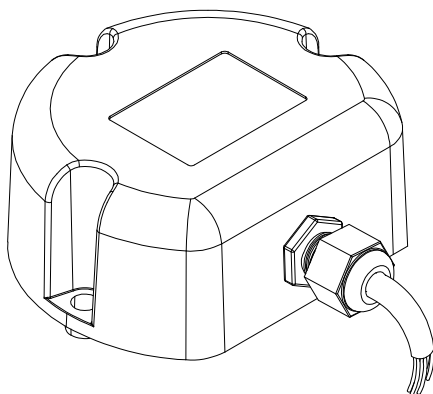


USER MANUAL

DPSKO-xx

Dual axis planarity sensor with relay or open collector output



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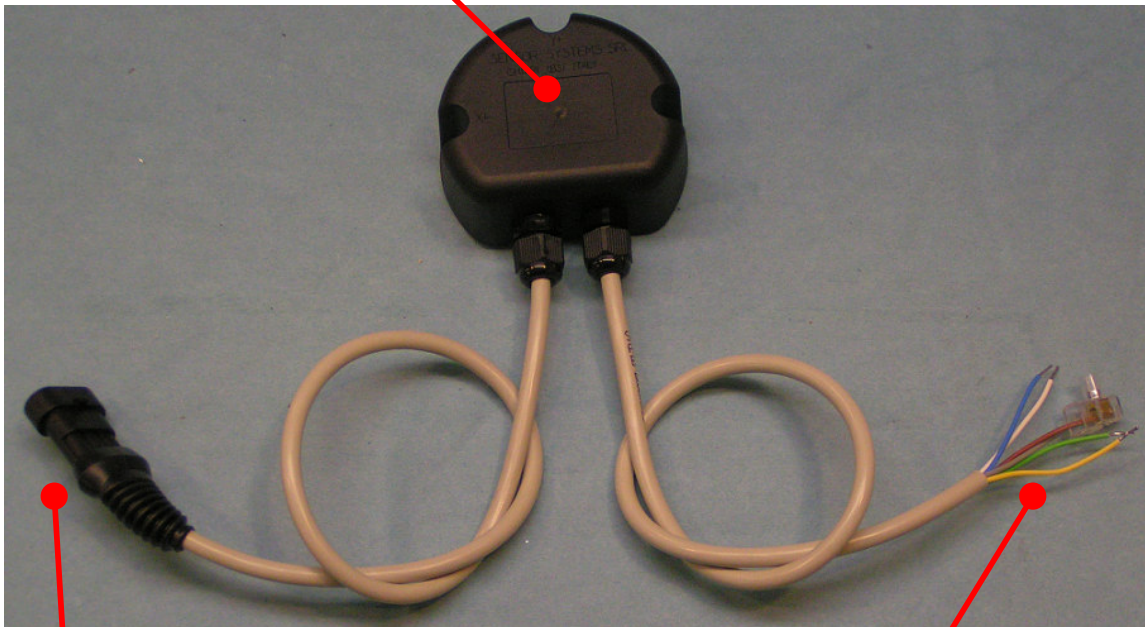
1 – Working principle

DPSK micro controlled planarity indicator is a digital device capable of:

1. operating as a common planarity indicator, living as an output axis X and Y planarity, separately over a 360° degrees range;
2. giving as an output X and Y planarity for two half axis each, allowing DPSK to be used for auto-levelling or other (optional) functions. Zero setting can be achieved through a dedicated cable (optional) or through RS-232 dedicated commands (optional).

DPSK shows reference directions for positive and negative X/Y half-axis.

PLASTIC ENCLOSURE



PROGRAMMING CABLE
RS-232 connection
(Rx, Tx and RS-232 Gnd)

SUPPLY CABLE, RELAYS
OUTPUT, PNP OUTPUT and ZERO

2 – Technical features

2.1 - Relay / open collector planarity control output

Supply voltage = +9 ... +30 Vdc

Max output current (planarity control, relay) = 1.0 A @ 50 °C

Max voltage output (planarity control, relay) = + 24V dc

Max output current (planarity control, axis half-axis, transistor) = 1.0 A @ 50 °C

Supply current max (relay output) = 200 mA

Supply current max (transistor output) = 100 mA

2.1.1 - Annotation 1:

Relay and open collector outputs are protected using 1A built-in self-repairing fuses.

2.2 General features

Angle range: from -20° to $+20^{\circ}$ each axis;

Resolution: $\pm 0.1^{\circ}$

Zero point temperature drift: ± 0.002 deg/ $^{\circ}$ C

Temperature working range: from -20 °C to $+70$ °C

Standard protection grade: IP 66

Standard cable length: 30 cm

3- Safety

3.1 Protections

Built-in device protection:

A) Supply

- reverse polarity;
- overvoltage.

B) Planarity output (relay):

- short-circuit;
- overvoltage.

C) Axis/half-axis output (transistor):

- short-circuit;
- overvoltage.

D) Axis/half-axis output (relay):

- short-circuit

3.2 Conformity

DPSK conforms to the following EMC standards:

EN 61000 – 6 – 3 : 2002

EN 61000 – 6 – 2 : 2002

4- Electrical connections

4.1 Preparation

Cable choice

To avoid any dysfunction due to incorrect wiring, device shall be cabled granting optimal electric insulation of all parts accessible by unspecialised operators (insulating resistance $> 1\text{G}\Omega \times \text{cm}$).

Mounting must avoid improper cable bending, traction, twisting pressing or squeezing during machine operation.

Cable shall be chosen so to conform device specific application.

Supply:

1,5 mm² cabling under 1,5 m in length
2 mm² if cabling is over 1,5 m in length

Communication:

RS-232 standard cables

Digital input/communication:

0,5 mm²

Digital output/communication:

0,5 mm² low-power exit
1 mm² high power exit

Some version may not feature all the connections described.

4.2 Supply

<i>Cable colour</i>	<i>Description</i>	<i>Function</i>
WHITE	Positive supply	+ 7 ... + 30 Vdc
YELLOW	Negative supply	Gnd

4.3 Planarity output (Relay)

<i>Cable colour</i>	<i>Description</i>	<i>Function</i>
BLUE	Common relay	-
GREEN	NC Relay	Normal closed
GREY	NO Relay	Normal open

4.4 Serial RS232 communication

<i>Cable colour</i>	<i>Description</i>	<i>Function</i>
AMP PIN 2	Rx RS232	Rx to PC connection
AMP PIN 3	Tx RS232	Tx to PC connection
AMP PIN 1	Gnd RS232	Gnd to PC connection

Annotation 2:

RS-232 levels are already shifted to allow direct communication with PC port COM1 or COM2

4.5 Zero

<i>Cable colour</i>	<i>Description</i>	<i>Function</i>
BROWN	Zero cable (with connector-protected termination)	Apply positive voltage for 3 to 7 seconds. Check cable termination after use for correct insulation.

4.6 PNP transistor output

<i>Cable colour</i>	<i>Description</i>	<i>Function</i>
PINK	PNP output	-

5- Calibration and setting using RS-232 connection

5.1 Zero

Device zero is factory-calibrated. An after-mounting zeroing is preferable in most of the cases.

Zero can be achieved in two ways:

5.1.1 – using the following RS-232 specific command (via Hyperterminal-like program):

ZERO < Enter>

5.1.2 – applying a positive voltage to the “zero-cable” (***brown cable***) for more than 3 seconds and less than 7 seconds.

No LED outputs are available.

Zero is common to both relay function *and* half-axes setting.

5.2 Relay switching point

Relays switching points are factory-set. Factory settings can be modified using RS-232 communication with any Hyperterminal-like program.

Please refer to the following commands to set intervention ranges:

5.2.1 **MDEGX** maximum allowed angle for X axis (related to defined zero).

5.2.2 **MDEGX** maximum allowed angle for Y axis (related to defined zero).

Both MDEGX and MDEGY can be set between 0° and 20° abs (absolute value: i.e. if device is set with zero at 5°, 20°-5° = 15° are left to cover working range).

To set switching angle for X axis using MDEGX command please type desired angle value multiplied by ten (to allow definition of decimal values of the angle):

MDEGX=40 < Enter>

Sets switching point to 4°.

MDEGX=25 < Enter>

Sets switching point to 2.5°

MDEGX=5 < Enter>

Sets switching point to 0.5°.

5.3 Switching delay interval

Switching delay interval are easily selectable using RS-232 commands between 0.1 and 25.5 seconds. Delays are selectable using RWAIT command (delay before intervention: waits X seconds to activate alarm) and FWAIT (delay after intervention: waits X seconds to deactivate alarm).

RWAIT=22 < Enter>

Sets a delay time of 2.2 seconds to activate alarm over axis X or Y.

FWAIT=12 < Enter>

Sets a delay time of 1.2 seconds to deactivate alarm over axis X or Y.

5.4 Configuration using RS-232 protocol

IMPORTANT:

Parameters shall be typed in CAPITAL letters

RS-232 settings are the following:

Communication:	9600 bits/s
Data bit:	8
Parity:	none
Stop:	1
Flow control:	none

On power-on DPSK sends through RS-232 the following info concerning the device:

- device code;
- HW version;
- SW version;

And waits for the user to send commands.

To ensure the device is operating please press <ENTER> key. If the device is operating and waiting the answer will be: "SYNTAX ERROR" .

If no returning syntax error message is shown please check connections (both RS-232 connection and supply voltage connection).

To **read** the corresponding value of a given parameter the user must type the name followed by

:

RWAIT:

Gives as an output on the screen the value of RWAIT parameter.

To **write** the desired value of a given parameter the user must type the name followed by

=

And the desired value and pres <ENTER> key

RWAIT=12 <Enter>

Sets RWAIT to 1.2 seconds

If the user gives a parameter an *out-of-range* value or a *wrong* name “*Syntax error*” will be printed on the screen.

In such a case the user shall press <ENTER>.

5.5 RS-232 parameters table

Parameters for RELAY OUTPUT

Parameter	Standard	Value	Description
CHGREL	255	[0,255]	Relay output setting: 0: normally NOT OPERATING; operates after X or Y switching point is reached 255: normally OPERATING; gets not operating after X or Y switching point is reached.
RWAIT	1	[1-255]	Delay to activate alarm, from 100 ms to 25.5 seconds
MDEGX	50	[1-200]	Maximum angle for X axis
MDEGY	50	[1-200]	Maximum angle for Y axis
FWAIT	1	[1-255]	Delay to deactivate alarm, from 100 ms to 25.5 seconds
ZERO	-	-	Zeroing

Parameters for OPEN COLLECTOR OUTPUT

Parameter	Standard	Value	Description
CHGOUT	255	[0,255]	Relay output setting: 0: normally NOT OPERATING; operates after X or Y switching point is reached 255: normally OPERATING; gets not operating after X or Y switching point is reached.
FWAITX	1	[1-255]	Delay to deactivate X-axis alarm from 100 ms to 25.5 s
FWAITY	1	[1-255]	Delay to deactivate Y-axis alarm from 100 ms to 25.5 s
RWAITX	1	[1-255]	Delay to activate X-axis alarm from 100 ms to 25.5 s
RWAITY	1	[1-255]	Delay to activate Y-axis alarm from 100 ms to 25.5 s
MXN	10	[1-200]	Maximum angle for X- half-axis
MXP	10	[1-200]	Maximum angle for X+ half-axis
MYN	10	[1-200]	Maximum angle for Y- half-axis
MYP	10	[1-200]	Maximum angle for Y+ half-axis

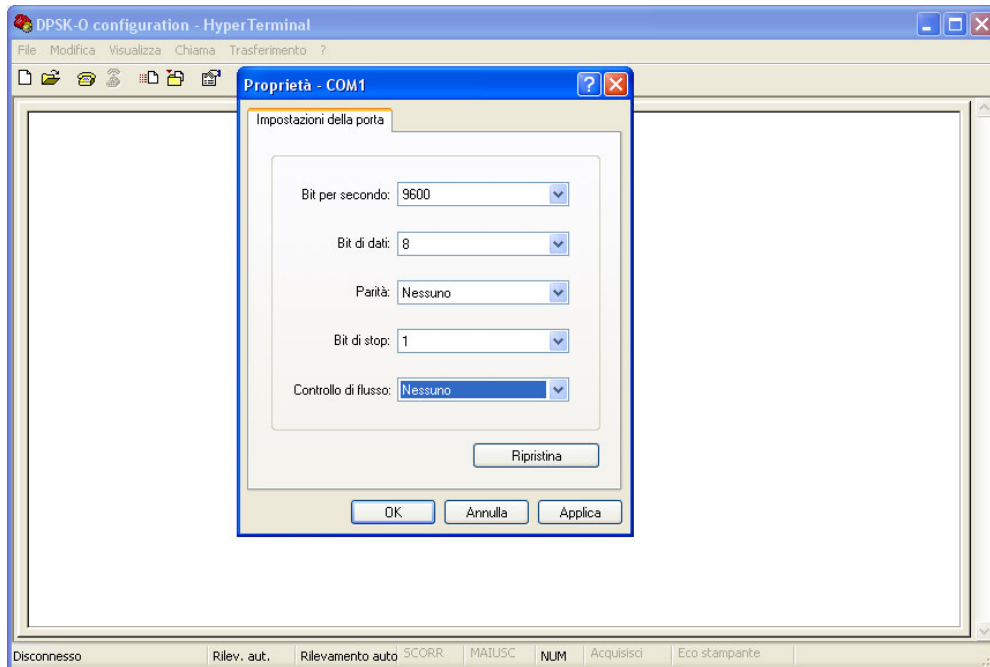
Parameters for Angle range Hysteresis setting (deactivates/activates alarm)

Parameter	Standard	Value	Description
ISTRELE	1	[0-200]	Angular Hysteresis for relay output (managed by MDEGX e MDEGY)
ISTSEMI	1	[1-200]	Angular Hysteresis for PNP output (managed by MXN, MXP, MYN e MYP)

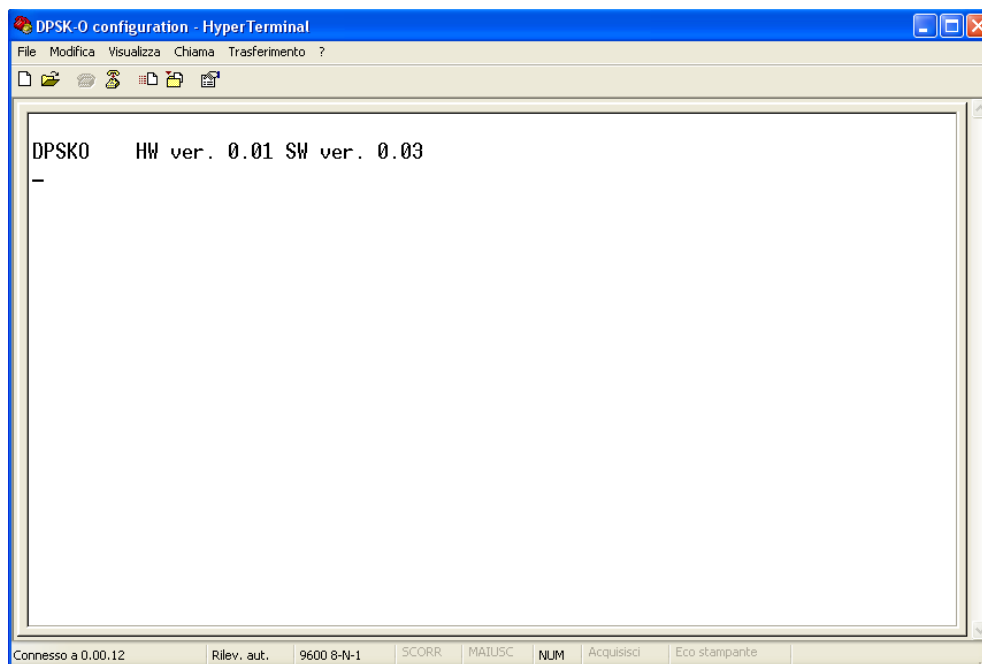
Angular values for hysteresis setting (ISTRELE and ISTSEMI) are expressed in 0.1°. Angular Hysteresis represents the minimum angle (over/under the switching point) able to activate/deactivate alarm.

Example of the configuration using Windows HyperTerminal:

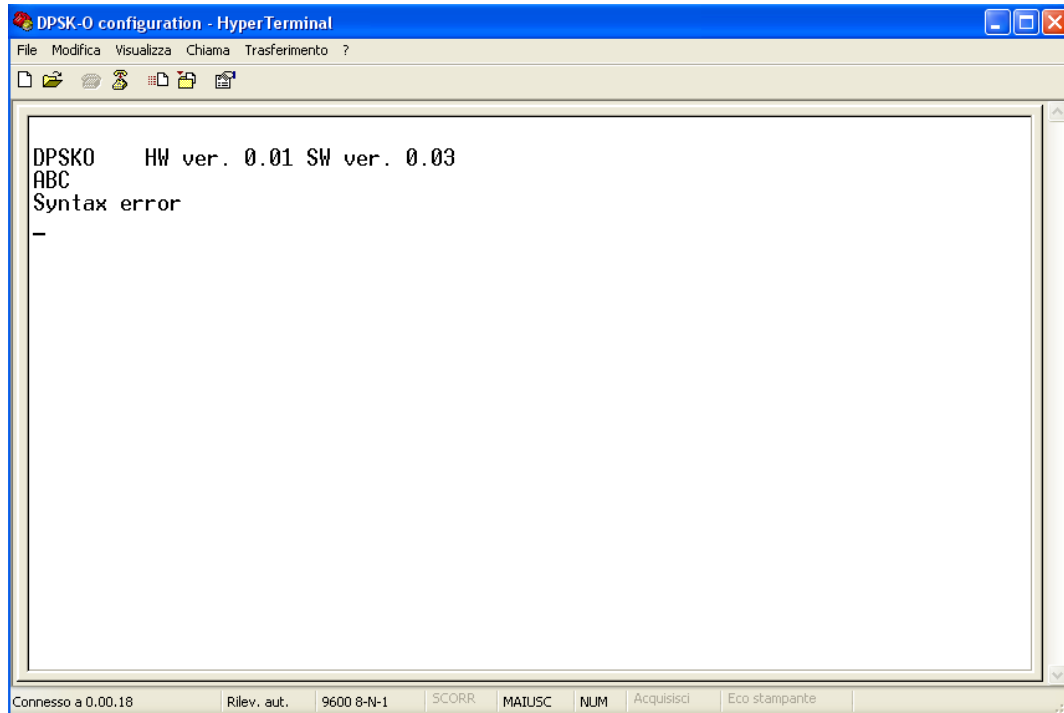
1) COM port configuration



2) After power-on DPSK sends through RS-232 the following info:



3) Command "ABC" has not been recognized by the device so DPSK sends through RS-232 the following info "Syntax error"



DSPK-0 configuration - HyperTerminal

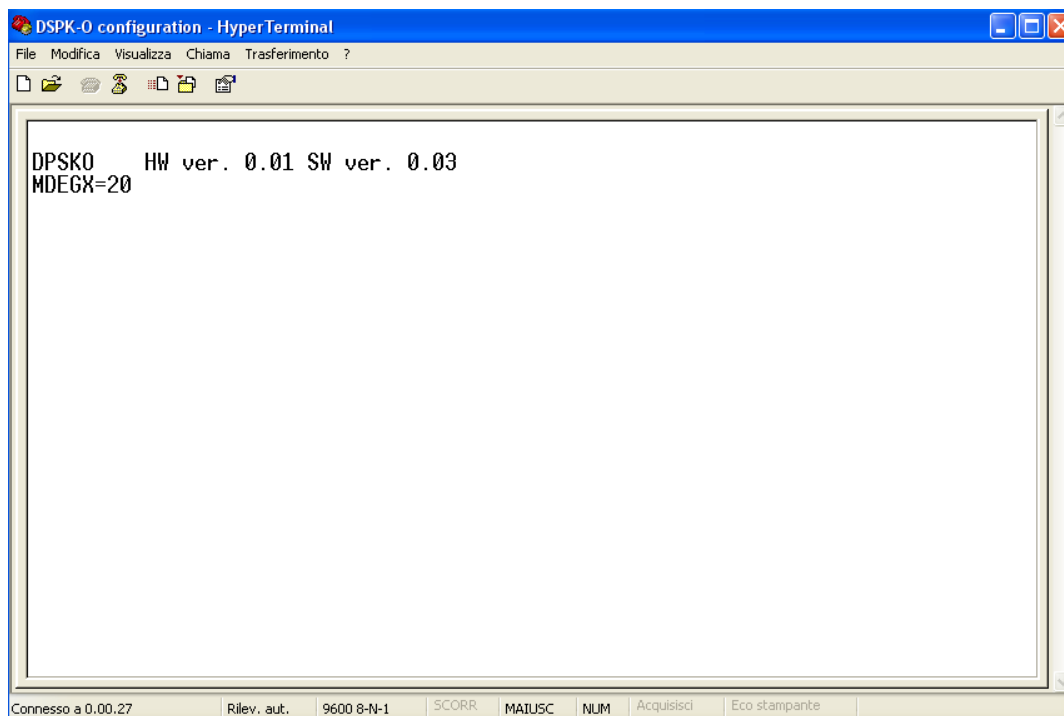
```
File Modifica Visualizza Chiama Trasferimento ?
```

```
DPSKO HW ver. 0.01 SW ver. 0.03  
ABC  
Syntax error  
-
```

Connesso a 0.00.18 Rilev. aut. 9600 8-N-1 SCORR MAIUSC NUM Acquisisci Eco stampante

4) Command "MDEGX=20" to set the switching angle for X axis at 2.0°. To set switching angle for X axis using MDEGX command please type desired angle value multiplied by ten (to allow definition of decimal values of the angle):

MDEGX=20 < Enter>



DSPK-0 configuration - HyperTerminal

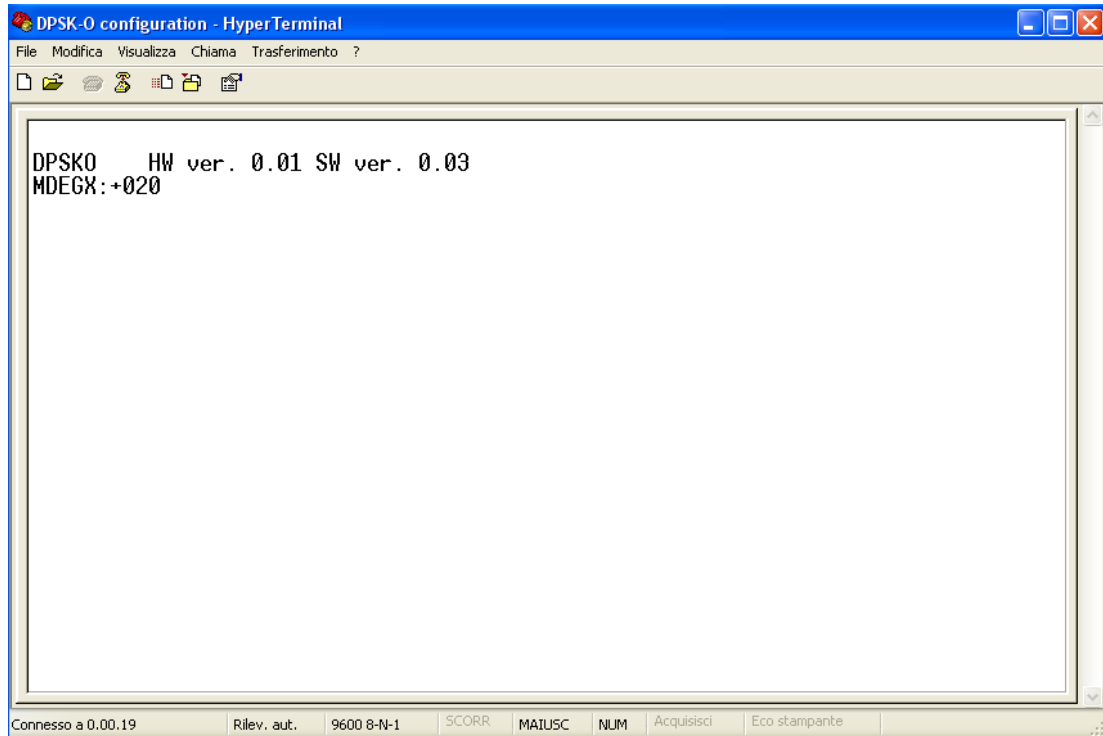
```
File Modifica Visualizza Chiama Trasferimento ?
```

```
DPSKO HW ver. 0.01 SW ver. 0.03  
MDEGX=20
```

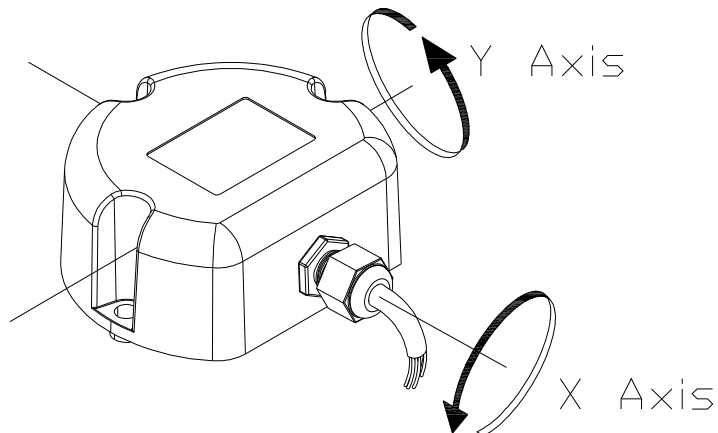
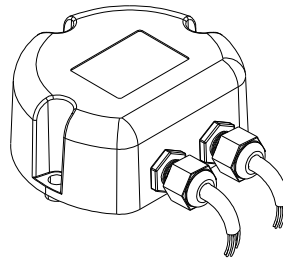
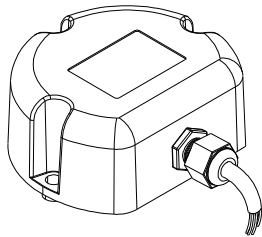
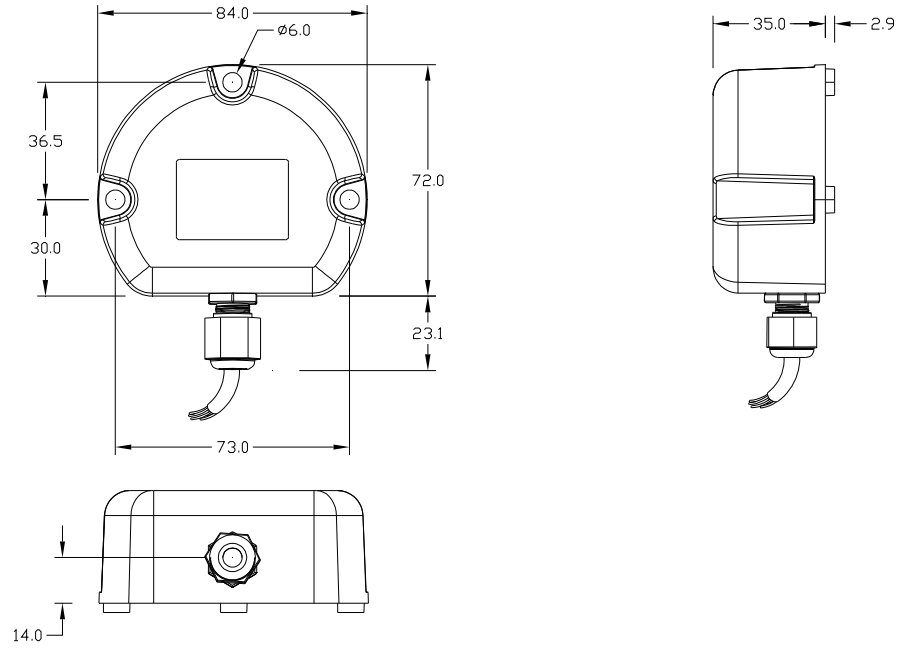
Connesso a 0.00.27 Rilev. aut. 9600 8-N-1 SCORR MAIUSC NUM Acquisisci Eco stampante

5) Command "MDEGX:" to read the switching angle for X axis already set. To read switching angle for X axis using MDEGX command please type desired angle value multiplied by ten (to allow definition of decimal values of the angle):

MDEGX:



6- Mounting



7- Dismission

Dismissing of DPSK shall be performed in according regional/national rules.

8- Precautionary measures, checks and maintenance

8.1 Precautions

8.1.1 – Power-on must be performed using battery;

8.1.2 – Supply must be cut-off before any intervention on cables, wiring or before any changes in mounting position;

8.1.3 – Do not perform welding on the mechanical structure or vehicle chassis holding the device BEFORE cutting-off positive and negative supply and any connections between all those elements.

8.1.4 – Cable shall be mechanically protected against excessive tensioning, torsioning, pulling, twisting, squeezing and sharp angle bending;

8.1.5 – Device and/or cables must not be placed near heat sources, EMI sources or power transmitting lines;

8.1.6 – Do not spray pressurized water or cleaning liquids directly over the device;

8.1.7 – Do not break, crack, pierce or make holes on the device;

8.2 Checks and maintenance

If the device is properly installed no maintenance is required during its whole working life.

The user is highly recommended to perform the following checks on the device to ensure its optimal functionality and avoid harms for the operator:

8.2.1 – mounting checks

After first-time assembling of device on the vehicle the following checks must be performed:

- Check battery voltage (must be correctly comprised into defined ranges and without noise)
- Check cable glands for correct fastening;
- Check for correct device's power-on and power-off using main switch;

8.2.2 – ordinary maintenance to be carried before use

- Visual check for device and cables integrity control;
- Supply battery voltage check to ensure correct supplying of the device;

- Device functionality check performed simulating different relay intervention situations.

8.2.3 – Extraordinary maintenance

Extraordinary maintenance comprises every maintenance which is not listed in the installation guidelines or ordinary maintenance paragraph.

Extraordinary maintenance shall be carried out by trained professionals.

Please contact directly Sensor Systems or the nearest of its authorized resellers.