

Nokeval

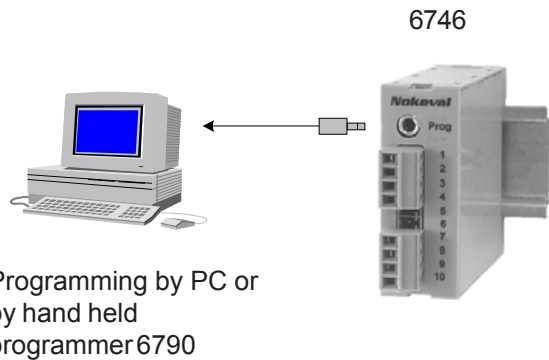
28.5.2004

User manual

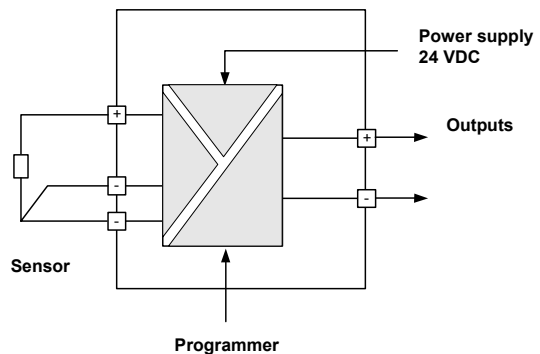
Programmable analog to frequency converter 6746B



Programmable signal converter 6746



Programming by PC or by hand held programmer 6790



Technical specification:

Thermocouples:

Sensor	Range	Linearity
E	-100... 900°C	< 0.2°C -50... 900°C
J	-150... 900°C	< 0.2°C -50... 900°C
K	-150... 1350°C	< 0.2°C -40... 400°C (<1°C > 400 °C)
L	-100... 900°C	< 0.4°C -50... 900°C
T	-150... 400°C	< 0.2°C -150... 400°C
N	0...1300°C	< 0.2°C 0... 1300°C
R	0...1700°C	< 0.3°C 400... 1700°C (<1°C < 300 °C)
S	0...1700°C	< 0.3°C 300... 1700°C (<1°C < 300 °C)
C (W5)	0...2200°C	< 0.3°C 400... 2200°C (<0.4°C < 400 °C)
D (W3)	0...2200°C	< 0.3°C 500... 2200°C (<1°C < 500 °C)
B	400... 1700°C	< 0.3°C 400... 1700°C
G (W)	1000.. 2200°C	< 0.4°C 1000... 1700°C (<3°C >1700 °C)
Range selection	freely selectable	

Calibration accuracy < 0.1 % of span
 Cold junction compensation < 0.05 °C /°C
 Sensor wire influence < 10kΩ, negligible

RTD's Pt100: Pt100 3- or 4-wire connections,
 Other RTD's Pt500, Pt1000, Ni100, Ni1000
 Range -200... +700 °C (Pt100, Pt250, Pt500)
 -200... +200 °C (Pt1000)
 0.....+175 °C (Ni100, Ni1000)
 Sensor current 0,3 mA
 Calibration accuracy: 0.05% of span
 Linearity < 0.05 °C (-200..700°C)
 Sensor error correction freely offset selection
 Other RTD's 0-1000 Ω, Potentiometer 50-500 Ω

Potentiometer input:

range 3-wire connection 50-500 Ω
 2-wire connection 2-wire 0-1000 Ω

mV inputs:

-100...+100 mV
 Accuracy 0,02% of span
 Input impedance >10 MΩ
 Linearity 0,02% of span

Process inputs:

0..20 mA, 4..20 mA, 0..5 V, 0..10 V,
 -10...+10V
 Input impedance Current: 5 Ω and voltage: 1 MΩ
 Accuracy: 0.02% of span
 Linearity: 0.01% of span

IR-sensors

Exergen 140F-K (60°C) and 440F-K (220°C)
 Range 140F-K -40..+350 °C (linearized range)
 Range 440F-K -30...+600°C (linearized range)
 Emissivity selectable by PC or hand held programmer

General description:

Signal converter 6746 is exceptionally versatile and accepts almost all common sensor inputs. You can configure it by PC. Transmitter front has configuration connector which connects adapter cable POL-RS232 to serial port of the PC. Menu based configuration program is easy to use. By hand held programmer 6790 you can easily control or configurate the transmitter in field conditions. The 16 bit A/D converter enables high accuracy. Linearity of A/D converter is 0.005 % and conversion accuracy of output signal is 0.05 %, without sensor linearization error. Galvanic isolation is specially important with thermocouples but potential differences with other measuring circuits can be avoided also in case of process input signals. Small size converter is provided with detachable connectors which speed up installation and programming. Large sensor selection and other inputs as well as versatility reduce stocking costs significantly because the 6746 suits for most measuring applications.

Manufacturer:

Nokeval Oy, Yrittäjätie 12
 FIN-37100 Nokia, FINLAND
 Tel: +358 (0)3 3424800
 Fax: +358 (0)3 3422066

Output:
 Output NPN, PNP (15V), or TTL
 Output scaling scaling on whole range, straight and reversed
 Range 0.03...2604 Hz or narrower
 Sensor break monitoring Min/Max freq, selectable

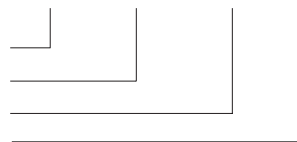
Configuration:
 Connection 2-pole Nokeval POL-connection
 Serial data 9600 bps
 Serial protocol SCL-Meku 1

General:
 Power supply 24 VDC \pm 15%
 Power consumption max. 40 mA
 Temperature effects <0.003%/°C
 Galvanic isolation 1000 VDC/ 1 min.
 Measuring rate 4 samples/s.
 AD-converter 16 bit
 Operating temperature 0..60 °C
 Ambient storage -20...+70 °C
 Humidity (non-condensing) 0..95 %RH
 Weight 80 g
 Connection 1.5 mm², AWG 16

How to order:

Type 6746 - Pt100 - 0/600 - 0/1000Hz

Model
 Sensor input
 Range
 Output

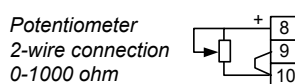
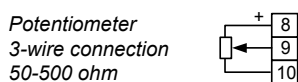
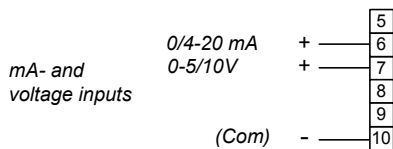
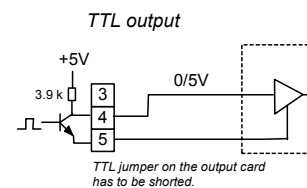
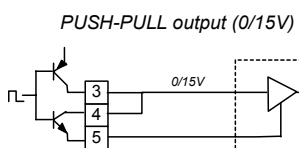
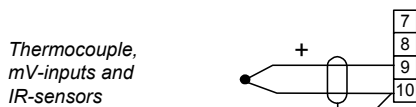
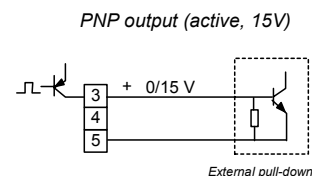
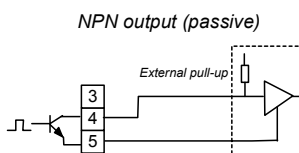
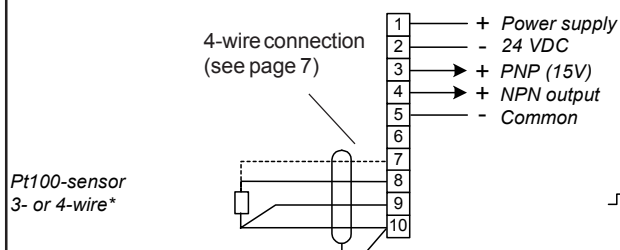


Example: 6746-Pt100-0/600, sensor: Pt100, range 0..600 °C, output 0..1000 Hz

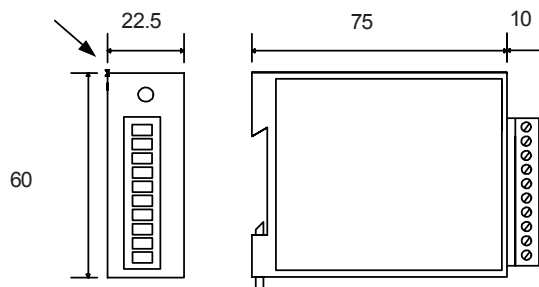
Transmitter is freely programmable but if you like it factory configured use above mentioned marking procedure.

Optional:
 Cable for transmitter/PC POL-RS232
 Configuration software MekuWin
 Hand held programmer 6790

Connection and dimensions:



Socket for POL-RS232 cable



Removable terminals <1.5 mm²
 Rail acc. to DIN 5002 (35mm)

Settings

With PC

To set the 6746 up with a PC, you need a programming cable POL-RS232, and software Mekuwin. The cable contains electronic circuits.

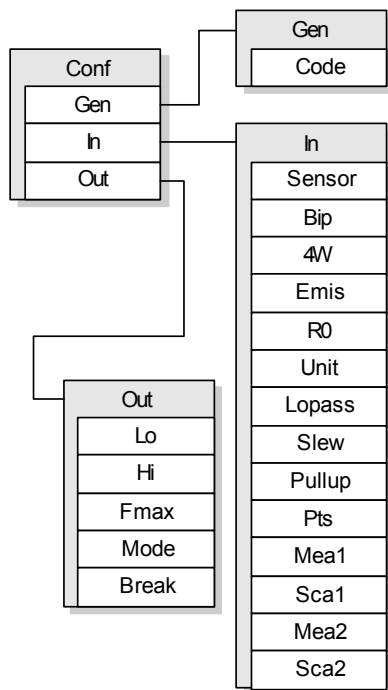
Select the COM port, 9600 bps, address 0 and slot 0. The converter must be powered. Establish a connection and do the settings. Finally click Save and Disconnect. The contents of the menu is described below.

With hand-held programmer

Connect the programmer to the Prog connector on 6746. Select parameters 9600 bps, address 0, and slot 0.

Menu tree

The configuration menu is divided into three submenus, Gen, In, and Out submenus.



Gen submenu

The Gen submenu contains only one setting, the configuration password Code. If it is set other than 000000, the configuration menu can't be accessed anymore without knowing the password. The password consists of six digits 1-4, but alphabetic letters can also be entered, since they are converted to digits.

In submenu

In submenu contains settings associated to the input and measurements. Some settings are hidden according to the sensor type selected.

Sensor

Sensor type selection.

mV

Millivolt measurement. Can measure 0-100 mV when Bip setting is off, or ± 100 mV when on. The result (Mea) is in millivolts.

V

Volt measurement. Can measure 0-10 V or ± 10 V depending on the Bip setting. The result is given in volts.

mA

Current measurement. Can measure 0-20 mA or ± 20 mA depending on the Bip setting. The result is in milliamps.

4-20mA

Same as mA, but interprets input below 2 mA to indicate fault (if the Pullup setting is on), and puts the output to the mode specified in Out menu item Break.

TcB...TcT

Thermocouple inputs. The internal CJ compensation is always on. With a K type element two ranges can be selected, wider TcK (-150...+1370°C) and more accurate TcKn (-80...+450°C). The emissivity correction function Emis can also be used.

E140, E440

Exergen K type infrared thermocouples 140°F ja 440°F. Specially linearized for those sensors. Use Emis setting to adjust the reading according to the target surface emissivity.

ohm

Resistance measurement, e.g. a rheostat. 4W setting is used to select between three and four wire measurement. The result is in ohms.

Pt, Ni

Resistance temperature sensors. Use 4W setting to select three or four wire connection. The nominal resistance of the sensor (0°C) is selected in R0.

Pot

Three wire potentiometer in a potentiometric connection (slidewire). The result is in percents 0...100.

Bip

Selection between unipolar and bipolar measurement. The unipolar mode is slightly more accurate, but can't measure negative voltage or current.

4W

Selection of four wire resistance measurement (on=4W, off=3W). When the four wire connection is used, the input card jumper has to be set accordingly.

See the picture.

Emis

Emissivity correction for infrared thermocouples. Can be used with ordinary thermocouples too to compensate e.g. poor thermal connection between the sensor and the target. Set to 1 to not to correct. Smaller value will amplify the reading in respect to the ambient temperature. The converter should be at the same ambient temperature as the target for the correction to work properly.

R0

Resistance temperature sensor nominal resistance at 0°C, e.g. with a Pt100 set to 100. If the accurate resistance of the sensor is known (e.g. 100.03), set the value here to cancel the error.

Unit

Temperature unit with thermocouple and RTD inputs, °C or °F.

Lopass

Digital lowpass filter for input. Functions like a RC circuit damping variations in the reading. Set the time constant in seconds. Recommended value 1. To disable filtering, set to 0.

Slew

Slew rate limiting. The reading can't change at one measurement cycle more than the value specified here. There is about 4...5 cycles per second. To disable, set to 0.

Pullup

Wire break sensing. If set on, a small current will be sent intermittently to the sensor wires to detect faults. If the wires or the sensor is found to be faulty, the output will go to Break state, see Break at Out menu.

Pts

Number of linearisation points.

0=no linearisation/scaling.

1 = single point offset correction. Set Mea1 to correspond to the uncorrected reading (Mea) and Sca1 to the wanted corrected reading.

2...10 = multi point scaling/linearisation. Set the bare measurement results (Mea) to the Mea points, and the corresponding corrected/scaled readings (in engineering units) to the corresponding Sca points. A linear interpolation is used between these. The Mea values must be in ascending order, the smallest first!

Out submenu

Out submenu is used to configure the frequency output.

Lo = reading (Sca) corresponding to output 0 Hz.

Hi = reading corresponding to Fmax Hz.

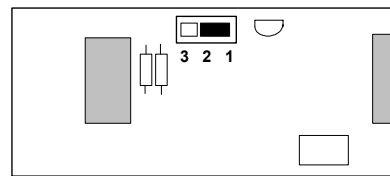
Fmax = maximum output frequency (1-2600 Hz).

Mode = limiting: If set to Limit, the output will not exceed Fmax.

Break = operation at sensor fault, either 0 Hz (DScale) or maximum frequency (UScale).

Selecting between V input and four wire resistance measurement in the input card. Detach the card to see the jumper.

Jumper selections of input card



Voltage input 0-10V:
Jumper selection 1-2
(Factory setting)

4-wire RTD-sensors:
Jumper selection 2-3

Monitoring and simulating

Use the monitoring function in your configuration software/device. There is three items to monitor:

Mea = not scaled but filtered measurement result

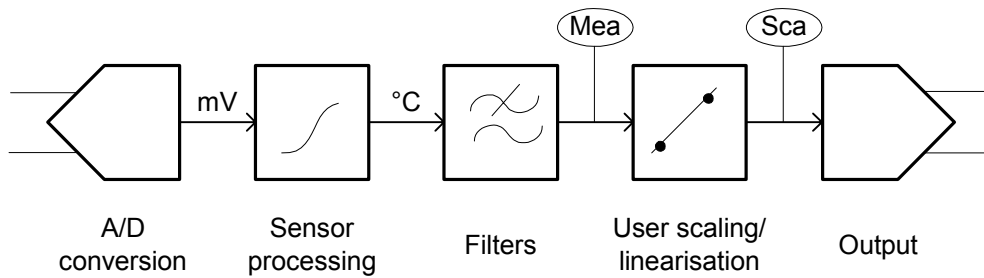
Sca = scaled reading (using Mea-Sca pairs).

Out = output frequency Hz

In addition there is one diagnostic message (Diag):

Wbk = sensor or sensor wire broken.

The converter has a simulation function to examine the linearisation table and the effect of the output on the other system. Send a Lock command (L butt in Mekuwin) for Mea or Sca monitor item and write the simulated reading. The converter will then act like it was a real result. Use Free to return to normal operation.



Description of the operation

The measured voltage, current, or resistance is processed according to the selected Sensor type. mV/V/ohm inputs will be passed as is, but with the temperature sensors the temperature reading is calculated. After this, Lopass and Slew filters are applied. The filtered result can be observed in the monitor menu Mea.

If Pts setting is larger than 0, the user correction/ scaling/linearisation with Mea-Sca-pairs is applied. This reading can be seen in the monitor menu Sca. You can use the scaling possibilities to convert the measurement result to represent a real engineering value, e.g. pressure in bars.

The output is formed from the scaled reading (Sca) using the settings in the Out submenu.

Manufacturer:

Nokeval Oy

Yrittäjätatu 12

37100 NOKIA

Tel. +358 (0)3-342 4800 email mail@nokeval.com

Fax. +358 (0)3-342 2066 [http:// www.nokeval.com](http://www.nokeval.com)