

## 2071 Panelmeter for serial communication

- Serial inputs RS-232 and RS-485
- 6-digit processor-based LED display
- Input galvanically isolated
- Front panel keys can be read
- Power supply 85..240 VAC or 24 VDC/ 24 VAC
- Front panel protection IP65



The panelmeter 2071 is designed for serial communication. It uses the simple Nokeval SCL protocol where only the address, value and check sum are sent. The panelmeter has both the serial inputs RS-232 and RS-485 as a standard. The serial bus is galvanically isolated from the processor and the power supply. In the configuration mode you can set the address, baud rate and the type of number value that you want to appear on the display after power connection.

In industrial environments use of the addressable serial signal RS-485 is always recommended. 31 displays can be connected to one bus and by using a serial data converter (721R), another 31 displays can be added on. The maximum distance of the bus is 1 km. Serial input RS-232 only accepts one display connected to the bus the maximum distance being 15 m. Front panel protection is IP65.

The panelmeter series 2000 is very flexible and easy to modify by changing input cards for different kinds of sensors, such as temperature sensors, pulse sensors, serial inputs etc. The modification does not require any calibration. The optional cards are the same for all the instruments in this product family. Each panelmeter type has its own datasheet.

Separate field enclosures can be supplied for 1 to 3 panelmeters. The 2071 is also available in the field display series, model 2800-2071.

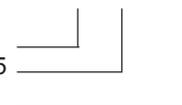
### Technical specifications:

Input:	serial signal RS-485 and RS-232, selection with terminal connections, galvanically isolated
Max. distances:	1000 m with RS-485 20 m with RS-232
Number of meters in one loop:	1 with RS-232; 1-31 with RS-485
Data	8 characters, 1 stop, no parity
Addresses:	0...99
Baud rate:	300, 600, 1200, 2400, 4800, 9600 and 19200 baud
<b>General:</b>	
Display	6 digits, bright red (or green) LED, digit height 14.5 mm, brightness selectable
Operating temperature	-10..+60 °C
Terminals	removable, wire 2,5 mm <sup>2</sup>
Power supply	85...240 VAC or 12..32 VDC/ 24VAC
Front panel protection	IP65 with a rubber gasket
Case dimensions	48 x 96 x 115 mm (DIN1/8)
Weight	240 g

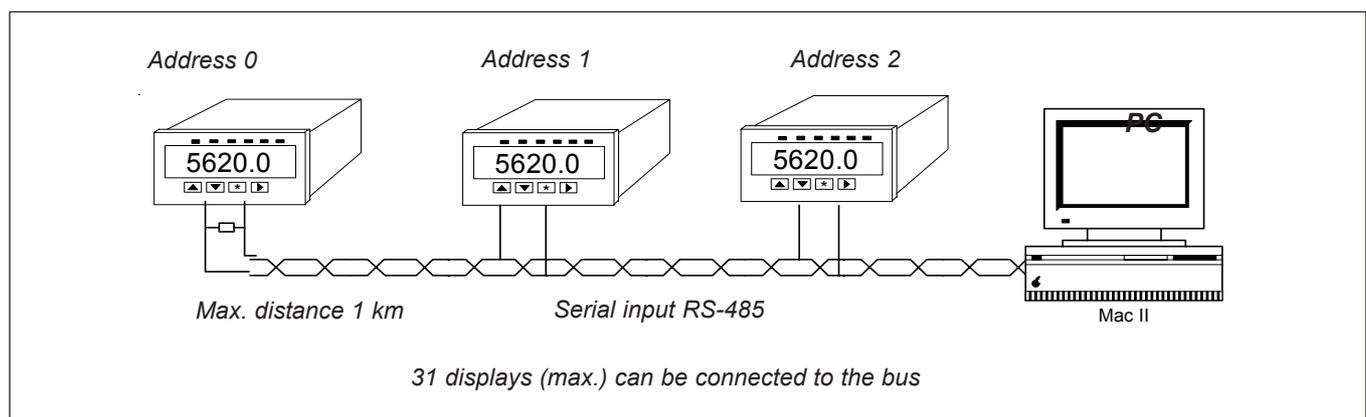
### How to order:

**2071-RS-230VAC**

Type  
Serial output card RS232/485  
Power supply 230VAC or  
12..32 VDC/ 24 VAC



The panelmeter is also available with a green LED display: please specify 2071GR in the order code.



# Nokeval SCL Protocol

## for Panelmeter 2071 and Field display 2800-2071

### Communication parameters

Baud rate: 300, 1200, 2400, 4800, 9600 or 19200  
 8 data bits, None parity, 1 stop bit.

### Protocols

The panelmeter 2071 and the field display 2071 can be controlled by two alternative protocols: either Nokeval SCL or Ascii. The protocol is selected in the configuration menu. Ascii protocol is very simple and there is no address involved, so every display will show the same reading. A detailed presentation of Ascii protocol is included in the manuals of the instruments.

### SCL protocol

The SCL command packet consists of the actual command added by some control bytes. Control bytes are needed to select the device to which the command is addressed from the bus, to express the beginning and the end of the command and to detect errors in the transmission.

### Commands for the display

You can send numbers and letters to the display by **DISP command** (use upper case):  
 DISP 123456 This command will display "123456".

LEDs on front panel can be controlled by **LED command**:  
 LED 00011X

This command will switch off the three leftmost LEDs (0), switch on the next two LEDs (1) and blink the sixth LED (X). The Conf LED cannot be controlled by SCL commands.

State of the keys can be read by **KEYB command**:  
 KEYB

This will send back a hexadecimal number indicating the state of the keys.

### Control bytes

SCL command packet format is:  
 <ID>CommandString<ETX><BCC>

The first byte sent is (ID), which acts as the start byte and also indicates the device address to which command is directed. ID byte is formed by adding 128 (80<sub>h</sub>) to the device address. If you want to communicate with the device at address 4, the value of the ID byte is 132 (84<sub>h</sub>).  
 Note: ID byte is one byte, do not send bytes '1', '3' and '2' instead!

ETX indicates the end of the command string. It is a single byte with the Ascii value 03<sub>h</sub>.

BCC is the checksum. It is calculated from the command string and ETX byte using XOR operation (ID is not included in the calculation). The length of the BCC is 1 byte. If you do not want to send the checksum, you can leave it out, but you must switch it off in the menu (BCC OFF).

An example of the command packet: (both the characters and their Ascii values in hex):

```
<80h> D I S P 0 <ETX><BCC>
80 44x49x53x50x20x30x03 = 1D
```

The x represents XOR operation in checksum calculation. As the ID is 80h, the target device is at address 0.

### Response

The 2071 will respond to a command by sending a response string. The format of a response to a successful command is:

```
<ACK>ResponseString<ETX><BCC>
```

However, if there were errors in the transmission or command, the format will be:

```
<NAK>ErrorString<ETX><BCC>
```

ErrorString is a numerical string indicating the type of error. "3" means checksum error and "4" an unknown command.

ACK-byte as the start byte of the response packet indicates that the device has accepted the command. The Ascii value of the ACK byte is 6 (06h).

NAK byte as the start byte of the response packet indicates that the device has rejected the command. The Ascii value of the NAK byte is 21 (15h).

The value of the ETX byte is 3 (03h) like in the command packet.

The content of the response packet depends on the command. The response for succesful DISP and LED commands is an empty string, that is <ACK><ETX><BCC>. For the KEYB command there will also be a response string.

The checksum BCC is calculated in the same way as in the command packet, including ACK or NAK byte, response string and ETX byte. This time the 2071 will calculate the BCC byte, and you can check it if you wish to.

## Terminal connections and dimensions (mm)

