TSC12 Multichannel Temperature Scanner

Features:

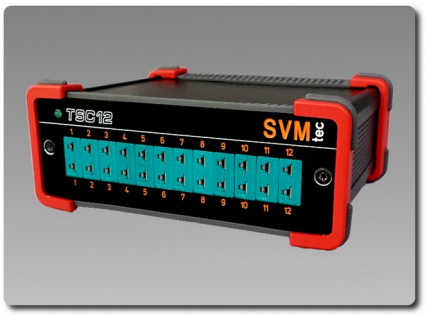
- Simultaneous measurement of **multiple thermo-couple (TC) voltages**
- Available Types: **K, T, J, B, E, N, R, S**
- Non-Linearity & hysteresis **max. +/- 0,5K**
- Data transmission and power supply **combined via USB-Port**
- Additional interface options: **CAN bus, LAN, RS232**
- Incl. **Software and LabVIEW driver**

Customer-specific adaptations:

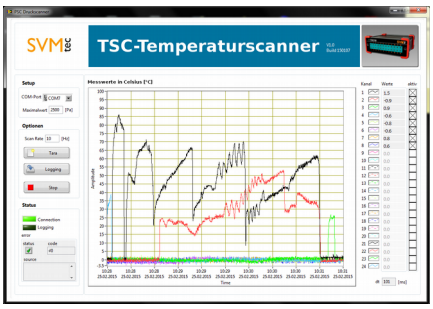
- **TC sockets** can be individually customized
- Selection of **interface options** for each device

Applications:

- Temperature measurements in **automotive** and **many other industries**
- Performance measurement of **coolers** and **thermo-dynamic processes**



TSC12



Software

SVMtec GmbH | Bergnelkenstraße 7 | 70563 Stuttgart | Germany | www.svm-tec.de
Contact: +49 (0)711 391867-0 | info@svm-tec.de

01.08.2018

Temperature scanner options

Available Thermocouple Sockets		
Typ	**min °C**	**max °C**
K	-270	1300
J	-210	1200
N	-270	1300
E	-270	1000
T	-270	400
R	-50	1768
S	-50	1768
B	0	1800
Accuracy and Sample Rates		
Accuracy	+/- 0,5K	
Sample rate per channel	1-100Hz	
Resolution (internal)	19-bit	
Power Supply		
TSC12	via USB	
TSC12-LAN/-CAN	7-24V, 0.2A	
Environmental Conditions		
Temperature	5°C...50°C	
Humidity	0...95%, non-condensing	
Dimensions		
Housing	130 x 55 x 95 mm (B x H x T)	
Driver and Software		
Virtual COM-Port-Driver		
Configuration software		
LabVIEW-example program as source code		
Supported Operating Systems		
Windows XP, 7, 8, 10, Linux		
Options		
All TSC systems can optionally be equipped with CAN bus, LAN or RS232		

SVMtec GmbH | Bergnelkenstraße 7 | 70563 Stuttgart | Germany | www.svm-tec.de

Contact: +49 (0)711 391867-0 | info@svm-tec.de

01.08.2018

General description

The TSC12 temperature scanners are capable of measuring 12 thermocouple voltage signals simultaneously, featuring high accuracy and a minimal offset drift. Each device can be individually customized according to customer specifications.

All common thermocouple socket types (K, T, J, B, E, N, R, S) are supported. Depending on the socket type, measurable temperatures stretch from -270°C to 1800°C.

The data is transmitted as ASCII text in the unit degrees Celsius [°C]. The transmission rate can be set in the range between 1 and 100Hz.

Power for TSC devices equipped with USB or CAN interface is supplied via USB-, respectively CAN-port itself. For the LAN interface version, an external power supply (9-24V, 1A) has to be connected to the device.

Both standard and -CAN TSC devices provide an USB interface for comfortable configuration. When connected via USB the temperature scanner identifies itself to the host PC as virtual COM port. Thus, any software supporting serial protocols can be used for communication. The LAN-version uses TCP-IP protocol for data transmission and configuration. A direct connection can be set up via **Telnet (Port 10001)**.

A recording software and an example program in LabVIEW (source code) are shipped with the device. For devices with CAN bus interface a DBC-file is included in the shipment.

On request there are different customization options:

- Selection of different thermocouple types in one device
- Combination of several data communication interfaces in one device
- Trigger- or alert function for specific configurable temperatures

SVMtec GmbH | Bergnelkenstraße 7 | 70563 Stuttgart | Germany | www.svm-tec.de

Contact: +49 (0)711 391867-0 | info@svm-tec.de

Serial interface

Command	Function	Answer
EE_LOAD	Load calibration data from EEPROM	#EEPROM:loaded
EE_SAVE	Save calibration data to EEPROM	#EEPROM:saved
*IDN?	Read device ID	TYPE **PSC8-USB** VERSION **1.0** SERNUM **#SN31xxxxx**
RATE x	Define sample rate for streaming mode range x = 10...5000 [ms] standard: 1000[ms] ~> 1[Hz]	#Rate=x ms #Error: Rate-Range
RATE 0	Activate request and trigger mode Actual values are read only after manual command „?“ is sent	#Request-Mode active
?	Read actual values (request-mode only)	
*RST	Reset scanllist settings	#RESET
SCAN_A x SCAN_B x SCAN_C x	Defines a scanlist (channel selection) Binary, each bit represents one channel	
FILTER x	Activate exponential filter 0 = deactivated; >0 = filter range in ms	#Filter=x
TC x K	Set thermocouple type of channel x to type K (available: K, T, J, B, E, N, R, S)	#TC x K
tx 1	Start streaming mode	#TX ON
tx 0	Stop streaming mode	#TX OFF

- for CAN bus version only -		
CAN_ID x	set CAN-ID	#OK
CAN_IT x	set interface x = 0: normal (11bit, CAN 2.0A) x = 1 extended 23bit (23bit, CAN 2.0B)	#OK
CAN?	read actual CAN configuration	#ID:0x[...]_Speed:[baud]_IDT:[0,1]
CAN_SPEED x	set CAN bus rate 0: 125 kBaud 1: 250 kBaud 2: 500 kBaud 3: 1 MBaud	#OK

Every command is terminated by a line break (CR, LF or CR+LF). The sensor enumeration of all devices starts at 1.

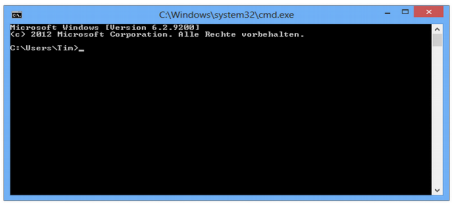
SVMtec GmbH | Bergnelkenstraße 7 | 70563 Stuttgart | Germany | www.svm-tec.de
Contact: +49 (0)711 391867-0 | info@svm-tec.de
01.08.2018

Telnet TCP communication example

Establish Telnet connection

Install or activate telnet (on Windows: enable telnet feature, see https://social.technet.microsoft.com/wiki/contents/articles/910.windows-7-enabling-telnet-client.aspx)

Open a terminal (on Windows: cmd.exe)



Enter "`telnet 192.168.1.200 10001`" (use the TSC's IP. The communication **port** is **10001**)

Data transfer modes

A Software trigger mode

Type "`rate 0`" to enter trigger mode (followed by `<enter>`)

Type "?" (followed by `<enter>`) → the TSC sends the most recent data in CSV format

TCP Command	**Answer**
`rate 0`	`#Request-Mode active. Send '?'`
`?`	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`

B External trigger mode

Type "`rate 0`" to enter trigger mode (followed by `<enter>`)

Connect external trigger to the scanner → on every trigger signal the TSC sends the most recent data in CSV format

TCP Command	**Answer**
`rate 0`	`#Request-Mode active. Send '?'`
trigger signal	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`

C Streaming mode

For continuous output set the output rate to any value from 10 to 5000[ms], e.g. "`rate 100`"

TCP Command	**Answer**
`rate 200`	`#rate=200ms`
`tx 1`	`#TX ON`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`...`

Data Format

The output data sent in CSV format. Values are tab "`/t`" separated and lines are terminated by a new line and a carriage return character "`/n/r`".

SVMtec GmbH | Bergnelkenstraße 7 | 70563 Stuttgart | Germany | www.svm-tec.de
Contact: +49 (0)711 391867-0 | info@svm-tec.de
01.08.2018

Scanlist

To choose the channels that are to be sent use the `SCAN` command.

`SCAN_A` sets the first 8 channels `SCAN_B` the following 8 etc. The adjacent number is the 8-bit representation of the 8 channels (each bit one channel)

→ `SCAN_A 3`: only channel 1 and 2 are read (`3` = 1 1 0 0 0 0 0 0)

TCP Command	**Answer**
`rate 200`	`#rate=200ms`
`tx 1`	`#TX ON`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`...`
`tx 0`	`#TX OFF`
`SCAN_A 3`	
`tx 1`	`#TX ON`
	`21.1200 22.2422`
	`21.1200 22.2422`
	`21.1200 22.2422`
	`21.1200 22.2422`
	`21.1200 22.2422`
	`...`
`*RST`	`#RESET`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`21.1200 22.2422 -10.2350 0.0210 -12.7820 ...`
	`...`

SVMtec GmbH | Bergnelkenstraße 7 | 70563 Stuttgart | Germany | www.svm-tec.de
Contact: +49 (0)711 391867-0 | info@svm-tec.de

VB .net example code

```
' TSC12-Example application -- Continuous mode
' Opens a TCP network stream and gathers the data continuously.
' -> while running, hit any key to exit

Imports System
Imports System.IO
Imports System.Net
Imports System.Net.Sockets
Module TSC_streaming
    Sub Main()
        Dim IP As String = "192.168.1.102"      ' Enter IP address here
        Dim Client = New TcpClient(IP, 10001)
        Dim values() As Double
        Dim d As Double
        Dim strArray() As String
        If Client.Connected Then
            Dim ns = Client.GetStream()
            Dim SR = New StreamReader(ns)
            Dim sw = New StreamWriter(ns)
            Dim line As String
            Dim quitNow = 0
            Dim count = 0
            sw.WriteLine("")                ' If there was something in the send-buf
                                              fer, we can clear that with one linefeed
            sw.WriteLine("RATE 300")        ' Command to set the scanrate to 300ms
            sw.WriteLine("TX 1")            ' Command to start the streaming mode
            '   Add commands if needed
            sw.Flush()
            While (Not Console.KeyAvailable)    ' every key pressed exits this demo
                line = SR.ReadLine()
                Console.WriteLine(line)
                strArray = line.Split(vbTab)
                If strArray.All(Function(number) Decimal.TryParse(number, d)) Then
                    values = Array.ConvertAll(strArray, Function(c As String) Val(c))
                                        'convert string to doubles for further use
                    ' do something with your values here...
                End If
            End While
            Console.Write("Just as example: last data[0] was: ")
            Console.WriteLine(values(0))
            Console.WriteLine("Closing connection and exiting demo")
            sw.WriteLine("TX 0")        '   Command to stop the streaming mode
            sw.Flush()
            Threading.Thread.Sleep(3000)
            SR.Close()
            sw.Close()
            ns.Close()
            Client.Close()
        End If
    End Sub

End Module
```

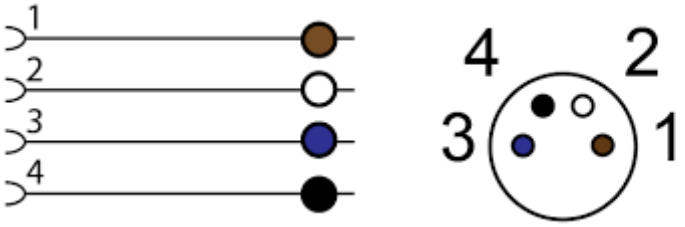

SVMtec GmbH | Bergnelkenstraße 7 | 70563 Stuttgart | Germany | www.svm-tec.de
Contact: +49 (0)711 391867-0 | info@svm-tec.de

PIN assignment (M8-connector)

Standard version:

Pin	Function	Cable colour
1	+ Supply	brown
2	not used	white
3	- Supply (GND)	blue
4	not used	black

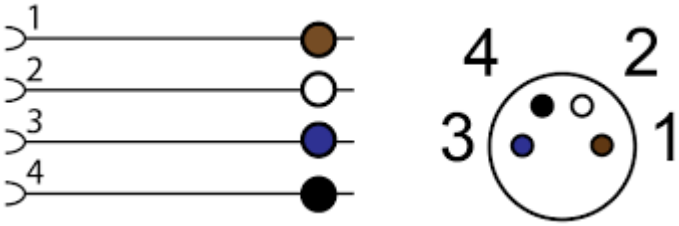
Table 1: Pin assignment standard version



Trigger version:

Pin	Function	Cable colour
1	+ Supply	brown
2	trigger low	white
3	- Supply (GND)	blue
4	trigger high	black

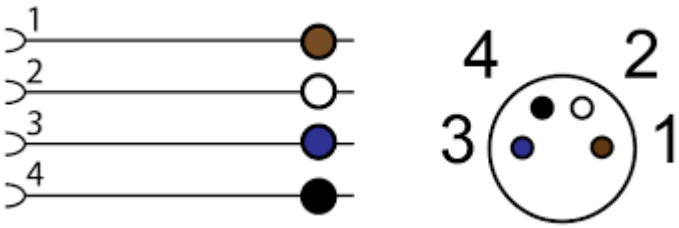
Table 2: Pin assignment trigger version



CAN bus version:

Pin	Function	Cable colour
1	+ Supply	brown
2	CAN low	white
3	- Supply (GND)	blue
4	CAN high	black

Table 3: Pin assignment CAN-Bus version



SVMtec GmbH | Bergnelkenstraße 7 | 70563 Stuttgart | Germany | www.svm-tec.de
Contact: +49 (0)711 391867-0 | info@svm-tec.de
01.08.2018