INSTRUCTION MANUAL

4-Channel Measuring Box 5804
8-Channel Measuring Box 5808

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1 Introduction

The 5000 Series measuring instruments are highly sensitive devices designed to connect inductive halfbridge transducers (probes).

The range of options offered by these units makes the solution of many measuring applications possible.

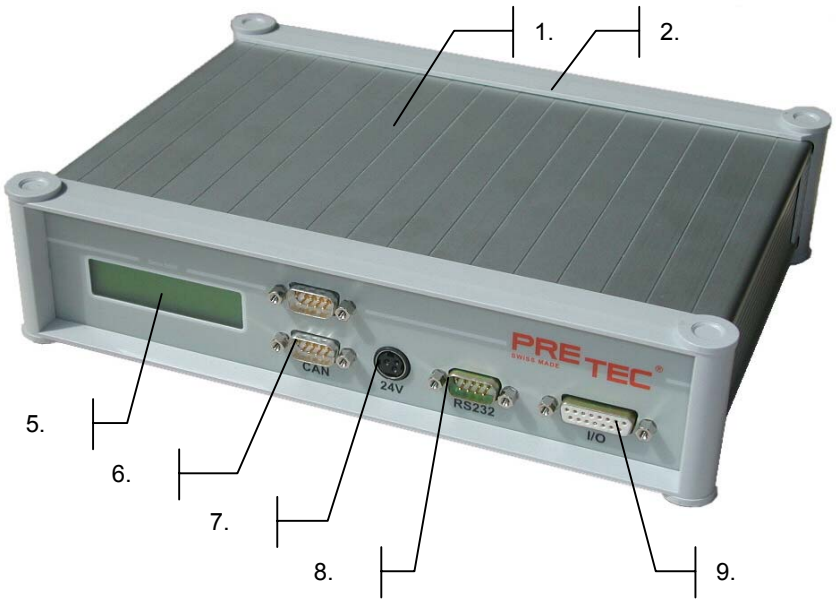
1.1 Technical Data

- Maximum 4 or 8 half bridge inductive transducers (probes) Tesa compatible
- 8 galvanically separate outputs
- 4 galvanically separate inputs
- Communication with RS232 or CAN-Bus
- Operating temperature 10°C-40°C (room temperature)
- 24V supply, max. 400mA (typical 250mA)
- Measuring speed is between 5ms and 500ms. The measuring speed depend principally on the resolution and the number of channels.

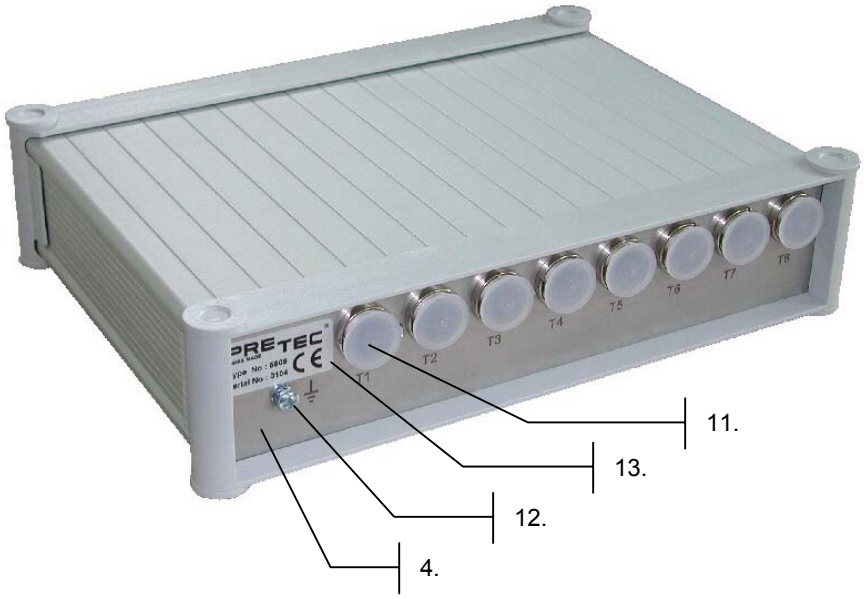
1.2 Components

List of components:

1. Aluminum body
2. Plastic cover
3. Front
4. Backplate
5. Display
6. CAN- receptacle
7. 24V Adapter receptacle
8. RS232 receptacle
9. Digital I/O receptacle



10. Plastic cap
11. Transducer (probe) T1...T4 receptacle
12. Ground wire receptacle
13. Type label



Important: The appropriate protective caps must cover unused connections at all times!

2 Start up

2.1 Installing your Series 5000 instrument:

- Unpack the instrument and check components.
- Connect the ground wire to the ground wire receptacle.
- Connect the other end of the ground wire to the measuring fixture.
- Plug the power adapter into a wall outlet or other power source.
- Connect the power adapter to the instrument.

The measuring instrument is now ready for use.

2.2 Factory settings:

The Series 5000 instrument is shipped with standard factory settings. This settings are:

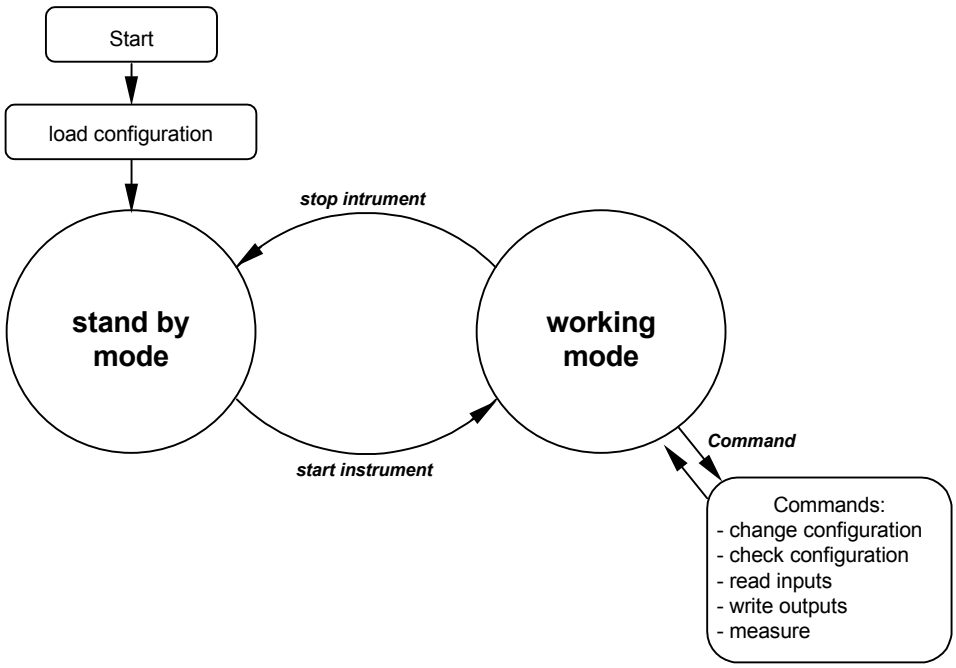
- Resolution (*): 1um
- Unit (*): metrics
- Probe type (*): GT21
- RS232 (*) 38400Baud, 8 Databit, 2 Stopbit, no Parity
- CAN device Address (*) 0100
- CAN answer Address (*) 0200
- = These parameters can be changed by the user at any time.

2.3 Grounding:

If the measuring fixture is already grounded, the instrument will also be grounded when a connection is established between the fixture and the instrument. Grounding is necessary both for the safety of the operator and for reliable measurement data acquisition.

If you have any questions or encounter any problems, contact your company electrician or an electrical installation company.

3 Software structure



3.1 Basics

The instrument has 2 mode: The standby mode and the working mode.

- Standby mode:
  In this mode you can disconnect the power supply without danger
- working mode:
  In this mode you should not disconnect the power supply. The microcontroller is allowed, to write data in the Eeprom and read them. If the write procedure is interrupted, the instrument may have some problems by starting up or does not boot at all.

3.2 Treating of a command

The normal case of a command treating is as followed:

- The superior system of the instrument is sending the command (as example @PS12 <CR> <LF>)
- The instrument take the command
- The instrument is verifying the command
- The instrument is interpreting the command
- The instrument is doing the work of the command
- The instrument send either
  - NOK (ASCII 06 / HEX 06) and a error code
  or confirm a successful operation with
  - ACK (ASC 21 / HEX 15) and the answer of the command (as sample the measuring value) and CR (ASCII 13 / HEX 0D) and LF (ASCII 10 / HEX0A)

3.3 Repetition of commands

In the case of communication problems, the instrument send the answer NOK (ASCII 06 / HEX 06) and a error code. In this case we propose to repeat the command once or twice again, before making a special error-handling. Reasons of communication problems can be: The microcontroller in the instrument is working in a multitasking - mode. Principally he should be ready to receive commands without error at all the time. In some cases it is possible, that the system is momentary not available and this can create failures.

4 Commands

4.1 Overview of commands (alphabetically)

Command			Description
@DC		<CR><LF>	display clear
@DS0	n	<CR><LF>	display scaled Probevalue no. "n"
@EC		<CR><LF>	echo (answer = PRETEC)
@GA		<CR><LF>	get CAN answer address
@GB		<CR><LF>	get CAN device address
@GC		<CR><LF>	get RS232 configuration
@GP0	n	<CR><LF>	get probe type of probe "n"
@GR		<CR><LF>	get resolution
@GU		<CR><LF>	get unit
@IA		<CR><LF>	read all digital inputs
@IS0	n	<CR><LF>	read digital input "n"
@OA	xx	<CR><LF>	write "xx" on all digital outputs
@OS	nx	<CR><LF>	write "x" on digital output "n"
@PS(np)		<CR><LF>	get scaled probevalue with channel number
@PT(np)		<CR><LF>	get scaled probevalue without channel number
@PU(np)		<CR><LF>	get unscaled probevalue with channel number
@PV(np)		<CR><LF>	get unscaled probevalue without channel number
#RT		<CR><LF>	reset
@SAnnnn		<CR><LF>	set CAN answer address
@SBnnnn		<CR><LF>	set CAN device address
@SC	nn	<CR><LF>	set RS232 configuration
@SP	np	<CR><LF>	set probe type
@SR	np	<CR><LF>	set resolution
@SU	pp	<CR><LF>	set unit
@VE		<CR><LF>	get eepromversion
@VS		<CR><LF>	get softwareversion
@XF		<CR><LF>	shutdown system
@XO		<CR><LF>	boot system

4.2 Detailed description of commands

4.2.1 Introduction

The indicate time is based on communication with RS232 (38400 Baud). Those values are measured with a testprogram. This time content:

- send the command
- check the command
- interpret and run command
- send back answer

The delays are measured values. If a command is send a few time, the delay can be deviate to our measure.

4.2.2 Command "general"

command	short description	description
@DC <CR><LF>	display clear	Clear the display and write „System OK“ on it Answer: <ACK><CR><LF> Delay: ≤ 16ms
@DS0 n <CR><LF>	display scaled probevalue no. "n"	Write value of channel "n" on display Parameter: n = channel number (1...8 or 1...4) Answer: <ACK><CR><LF> Delay: ≅ 1000ms for the first command ≅ 500ms for each repetition delay is depending on resolution Display can be cleared with command @DC.
@EC <CR><LF>	echo (answer = PRETEC)	Give a echo Answer: <ACK>PRETEC<CR><LF> Delay: ≤ 12ms
#RT <CR><LF>	reset	Make a general reset. No parameters will be changed. This command does only restart the instrument again, this will force the instrument to re-read the parameters from the Eeprom. Answer: <ACK><CR><LF> Delay: ≤ 5550ms
@VE <CR><LF>	get Eepromversion	Get the version of the Eeprom back. Answer: <ACK> 5804.01.00 <CR><LF> Delay: ≤ 12ms
@VS <CR><LF>	get Softwareversion	Get the version of the Software back. Answer: <ACK> 5808.01.20 <CR><LF> Delay: ≤ 12ms
@XO <CR><LF>	boot system	Push the instrument in the working mode. Answer: <ACK><CR><LF> Delay: ≤ 520ms
@XF <CR><LF>	shutdown system	Push the instrument in the standby mode. Answer: <ACK><CR><LF> Delay: ≤ 3500ms

4.2.3 Command "instrument configuration"

command	short description	description
@GA <CR><LF>	get CAN answer address	Get CAN-Answer address back Answer: <ACK>xxxx<CR><LF> Delay: ≤ 12ms
@GB <CR><LF>	get CAN device address	Get CAN-device address back Answer: <ACK>xxxx<CR><LF> Delay: ≤ 12ms
@GC <CR><LF>	get RS232 configuration	Get RS232-configuration back Answer: <ACK>0x<CR><LF> x = configuration 1 = 9600Baud/8Bit/2Bit/noparity 2 = 19200Baud/8Bit/2Bit/noparity 3 = 38400Baud/8Bit/2Bit/noparity Delay: ≤ 12ms
@GP0 n <CR><LF>	get probe type of probe "n"	Get probe type of channel "n" back Parameter: n = channel number (1...8) 0=all Answer: <ACK> xxx yyy<CR><LF> xxx = channel number yyy = type 001 = GT21 002 = GT61 Delay: ≤ 32ms (for @GP00) ≤ 12ms (for @GP01...8)
@GR <CR><LF>	get resolution	Get resolution of instrument back Answer: <ACK> xx <CR><LF> xx = resolution 03=1µm 13=1µm (fast) 04=0.1µm 14=0.1µm (fast) 05=0.01µm Delay: ≤ 12ms
@GU <CR><LF>	get unit	Get unit of instrument back Answer: <ACK>xx<CR><LF> xx = Masseinheit 00 = millimeter 01 = inch Delay: ≤ 12ms
@SAnnnn <CR><LF>	set CAN address	Set new CAN answer Address Parameter: nnnn= Address (00...2048) Answer: <ACK><CR><LF> Delay: ≤ 8ms Comment: After sending this command with CAN bus, the response <ACK> come back on the old address. In the next 500ms no communication is allowed. In this time the instrument change the address.
@SBnnnn <CR><LF>	set CAN address	Set new CAN device Address Parameter: nnnn= Address (00...2048) Answer: <ACK><CR><LF> Delay: ≤ 320ms
@SC0 n <CR><LF>	set RS232 configuration	Set new RS232-configuration Answer: <ACK><CR><LF> n = configuration 1 = 9600Baud/8Bit/2Bit/noparity 2 = 19200Baud/8Bit/2Bit/noparity 3 = 38400Baud/8Bit/2Bit/noparity Delay: 8...20ms, depend the baudrate comment: After sending this command, the response <ACK> come back in the old speed. In the next 500ms no communication is allowed. In this time the instrument change the speed.
@SP n p <CR><LF>	set probe type	Set probetyp "p" of channel "n" Parameter: n = Channel number (0...8) 0 =all p = Type 1 = GT21 2 = GT61 Answer: <ACK><CR><LF> Delay: ≤ 630ms

@SR pp <CR><LF>	set resolution	Set the resolution of the instrument Parameter: pp = resolution (03...05) 03=1µm 13=1µm (fast) 04=0.1µm 14=0.1µm (fast) 05=0.01µm Answer: <ACK><CR><LF> Delay: ≤ 3900ms (for @SR03) ≤ 3600ms (for @SR13) ≤ 4180ms (for @SR04) ≤ 4020ms (for @SR14) ≤ 14600ms (for @SR05)
@SUxy <CR><LF>	set unit	Set the unit of the instrument Parameter: pp = unit (00...01) 00 = millimeter 01 = inch Answer: <ACK><CR><LF> Delay: ≤ 640ms

4.2.4 Command "digital Inputs and Outputs"

command	short description	description
@IA <CR><LF>	read all digital inputs	Read all digital inputs Answer: <ACK>xx<CR><LF> xx = state of all Inputs (hex) 01=In1, 02=In2, 03=In1+In2, ... Delay: ≤ 14ms
@IS0 n <CR><LF>	read digital input "n"	Read digital input nr. "n" Parameter: n = Channel number (1...8) Answer: <ACK> xx <CR><LF> xx = state of input "n" (hex) 00=passiv, 01=aktiv Delay: ≤ 14ms
@OA xx <CR><LF>	write "xx" on all digital outputs	Write "xx" on all digital outputs Parameter: xx = value for outputs (hex: 00...FF) 01=Out1 02=Out2 03=Out1+Out2 ... Answer: <ACK><CR><LF> Delay: ≤ 14...19ms *)
@OS nx <CR><LF>	write "x" on digital output "n"	Write "x" on digital output nr. "n" Parameter: n = Output number (1...8) x = Zustand (0...1) Answer: <ACK><CR><LF> Delay: ≤ 14...19ms *)

*) the command @OAxx and @OSnx are in continuos usage slower than in single usage. This is system limited by the multitasking system of the microcontroller.

4.2.5 Commands "measuring scaled"

The scaled value is the value readback from the AD-Converter adapted to the chosen unit mm or inch.

command	short description	description
@PS(np) <CR><LF>	get scaled probevalue with channel number	get scaled probevalue n to p with channel number back Parameter: n = first channel (1...8) p = last channel (n...8) if p and n are missing, the system takes the last chosen numbers Answer: <ACK>xxxy/.../.../xxxy<CR><LF> xxx = Channel number (001...008) fix three signs y = value incl. +/- number of sign depend resolution and unit / channels separated by "/" Delay: see Chapter 4.3 Speed of the measuring commands
@PT(np) <CR><LF>	get scaled probevalue without channel number	get scaled probevalue n to p without channel number back Parameter: n = first channel (1...8) p = last channel (n...8) if p and n are missing, the system takes the last chosen numbers Answer: <ACK>y/.../.../y<CR><LF> y = value incl. +/- number of sign depend resolution and unit / channels separated by "/" Delay: see chapter 4.3 Speed of the measuring commands

4.2.6 Commands "measure not scaled "

The not scaled value is the value of the AD-converter. This value is depending on the resolution. The following table show the resolution, the range, and the zero, but also the formula for converting those values in a length with unit. After converting 24Bit values, they are masked on 19Bits.

CMD	range	zero	formula for mm	formula Formula for Inch
SR03	0...65'536	32'768	(value – 32768) * 256 / (4*10^6)	(value – 32768) * 256 / (4*10^6 * 25.4)
SR13	0...65'536	32'768	(value – 32768) * 256 / (4*10^6)	(value – 32768) * 256 / (4*10^6 * 25.4)
SR14	0...65'536	32'768	(value – 32768) * 256 / (4*10^6)	(value – 32768) * 256 / (4*10^6 * 25.4)
SR04	0...16'777'216	8'388'608	(value – 16'777'216) / (4*10^6)	(value – 16'777'216) / (4*10^6 * 25.4)
SR05	0...16'777'216	8'388'608	(value – 16'777'216) / (4*10^6)	(value – 16'777'216) / (4*10^6 * 25.4)

command	short description	description
@PU(np) <CR><LF>	get unscaled probevalue with channel number	get unscaled probevalue of channel n to p with channel number Parameter: n = first channel (1...8) p = last channel (n...8) if p and n are missing, the system takes the last chosen numbers Answer: <ACK>xxxy/.../.../xxxy<CR><LF> xxx = channel number (001...008) fix three signs y = value of AD-converter (16/24Bit) always 10 signs / channels are separated by "/" Delay: see chapter 4.3 Speed of the measuring commands
@PV(np) <CR><LF>	get unscaled probevalue without channel number	get unscaled probevalue of channel n to p without channel number Parameter: n = first channel (1...8) p = last channel (n...8) if p and n are missing, the system takes the last chosen numbers Answer: <ACK>y/.../.../y<CR><LF> y = value of AD-converter (16/24Bit) always 10 signs / channels are separated by "/" Delay: see chapter 4.3 Speed of the measuring commands

4.3 Speed of the measuring commands

The measuring speed with RS232 (38'400 Baud)

	resolution				
command	1µ	1µ (fast)	0.1µ	0.1µ (fast)	0.01µ
@PS11 <CR><LF>	= 16.0ms	= 13.9ms	= 42.1ms	= 16.1ms	= 453.2ms
@PS14 <CR><LF>	= 25.1ms	= 26.0ms	= 128.0ms	= 29.0ms	= 1778.6ms
@PS18 <CR><LF>	= 40.8ms	= 42.8ms	= 245.2ms	= 45.4ms	= 3538.0ms
@PT11 <CR><LF>	= 14.3ms	= 12.2ms	= 42.3ms	= 16.0ms	= 455.4ms
@PT14 <CR><LF>	= 22.5ms	= 24.2ms	= 127.5ms	= 28.0ms	= 1774.8ms
@PT18 <CR><LF>	= 34.3ms	= 39.7ms	= 243.9ms	= 43.7ms	= 3541.2ms
@PU11 <CR><LF>	= 14.7ms	= 12.8ms	= 40.9ms	= 14.2ms	= 453.0ms
@PU14 <CR><LF>	= 28.3ms	= 26.2ms	= 126.7ms	= 28.4ms	= 1778.0ms
@PU18 <CR><LF>	= 46.3ms	= 42.6ms	= 243.3ms	= 46.3ms	= 3541.8ms
@PV11 <CR><LF>	= 13.1ms	= 12.1ms	= 40.2ms	= 14.1ms	= 452.2ms
@PV14 <CR><LF>	= 26.0ms	= 24.1ms	= 126.6ms	= 26.1ms	= 1773.6ms
@PV18 <CR><LF>	= 42.1ms	= 40.1ms	= 243.3ms	= 42.3ms	= 3540.0ms

The measuring speed with CAN (500kBaud)

	resolution				
command	1µ	1µ (fast)	0.1µ	0.1µ (fast)	0.01µ
@PS11 <CR><LF>	= 11.9ms	= 9.9ms	= 38.3ms	= 11.9ms	= 451.4ms
@PS14 <CR><LF>	= 20.1ms	= 21.8ms	= 124.8ms	= 24.0ms	= 1774.4ms
@PS18 <CR><LF>	= 32.0ms	= 36.1ms	= 240.3ms	= 40.3ms	= 3538.4ms
@PT11 <CR><LF>	= 11.8ms	= 10.0ms	= 38.1ms	= 11.9ms	= 451.2ms
@PT14 <CR><LF>	= 19.8ms	= 21.9ms	= 124.1ms	= 24.2ms	= 1774.0ms
@PT18 <CR><LF>	= 31.9ms	= 36.0ms	= 240.0ms	= 40.3ms	= 3538.4ms
@PU11 <CR><LF>	= 9.7ms	= 7.8ms	= 36.2ms	= 9.9ms	= 448.4ms
@PU14 <CR><LF>	= 18.1ms	= 14.0ms	= 122.4ms	= 18.2ms	= 1773.0ms
@PU18 <CR><LF>	= 30.1ms	= 21.9ms	= 239.0ms	= 30.2ms	= 3537.8ms
@PV11 <CR><LF>	= 9.5ms	= 7.9ms	= 35.9ms	= 9.9ms	= 448.2ms
@PV14 <CR><LF>	= 18.0ms	= 14.0ms	= 122.5ms	= 18.2ms	= 1771.0ms
@PV18 <CR><LF>	= 30.1ms	= 22.0ms	= 239.3ms	= 30.2ms	= 3533.6ms

The different measuring speeds are inconsistently. By measuring 8 channels with the resolution 1µm, the fast mode is slower than the normal mode. This is system limited by the multitasking system of the microcontroller. Already smallest modification in software can change this. Our measures are made by a LabView program. All values are mean values of 10 single instructions (respectively 5 instructions at resolution 0.01µm). The used PC is a PII with 256MB RAM.

4.4 Error codes

Error	Short description	description
ER01	Wrong order	Wrong order
ER02	Wrong start sign	Wrong start sign, command does not start with "@" or "#"
ER03	Wrong order length	Length of command not correct
ER04	Wrong order extension	extension of command not correct
ER05	Order not successful	order was not successful

5 Interface

A superior system allows communication through a variety of digital in and output options. For optimal performance, we recommend that only the PRETEC connecting cable be used. These cables are specifically designed for industrial use and ensure stable and reliable operation of the unit.

5.1 Digital Inputs

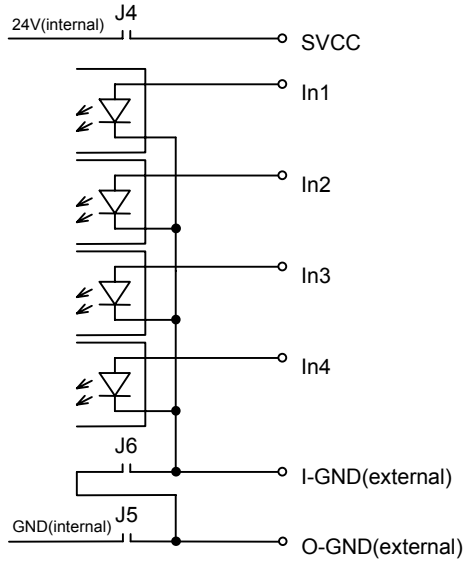
5.1.1 Description

Four digital outputs allow remote operation of the unit through external controls, e.g. a PLC. All inputs are active high. Usually inputs are used for starting the measuring or calibrating command.

5.1.2 Electronic Values and Settings

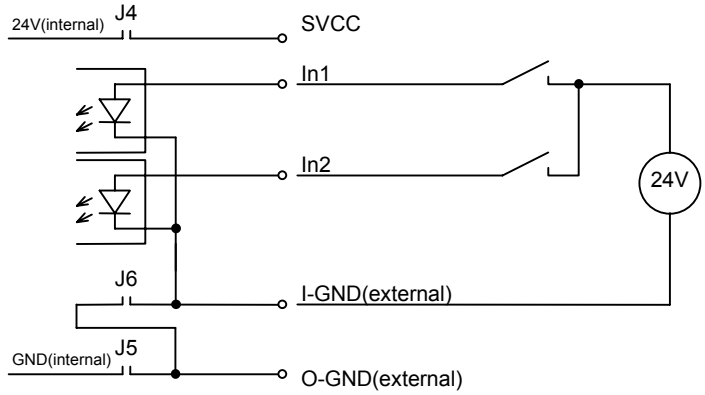
Symbol	Settings	Value	Unit
SVCC	-	18...30	[V_{DC}]
V_{IN}(low)	-	<1	[V_{DC}]
V_{IN}(high)	-	18...30	[V_{DC}]
I_{IN}	V_{IN}=24V	<10	[mA]
$V_{Isolation}$	J4, J6 open	2000	$V_{AC\ RMS}$

5.1.3 Diagram



5.1.4 Inputs with External control

Bridges J4 and J6 should be left open when using external controls to transmit a measuring or calibration (zero set) signal.

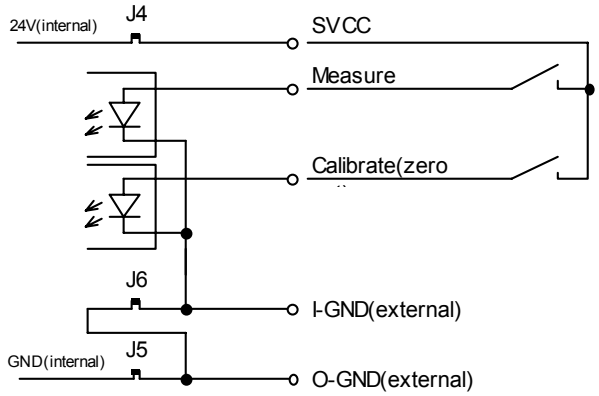


5.1.5 Inputs with Internal control

To use the internal control for inputs, bridges J4 and J6 must be closed.

Warning: with this configuration, the galvanic separation of the inputs does not apply.

Warning: The internal control can be used only for outputs singly or inputs and outputs together. It is not possible to use the internal control for the inputs singly and supply the outputs from external.



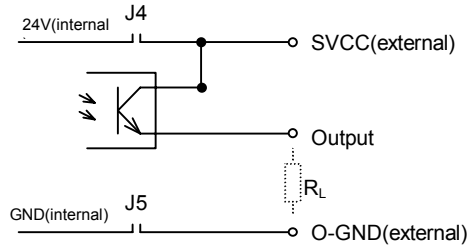
5.2 Digital Outputs

5.2.1 Description

Seven digital outputs allow information from the measuring unit to be reviewed through external controls, e.g. a PLC. Normally the outputs are used for to indicate ready for measure and for making signalisation.

5.2.2 Internal Circuit

The outputs are built as a open collector output. A display or other load must connect the output and 0-GND.



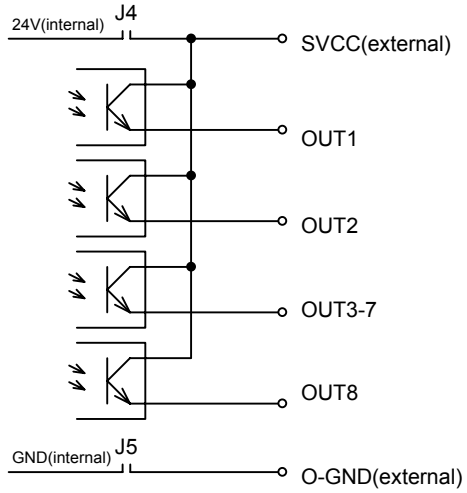
5.2.3 Electronic Values and Settings

Symbol	Settings	Values	Unit
SVCC	-	18...30	[V_{DC}]
V_{OUT}(low)	-	0.5	[V_{DC}]
V_{OUT}(high)	-	SVCC - 0.5	[V_{DC}]
I_{OUT}(low)	With internal control	500 1.)	[mA]
I_{OUT}(high)	With internal control	500 1.)	[mA]
I_{OUT}(low)	With external control	500 2.)	[mA]
I_{OUT}(high)	With external control	500 2.)	[mA]
$V_{Isolation}$	J4 and J5 open	2000	$V_{AC\ RMS}$

1.) maximum 500mA total (limited by AC adaptor)

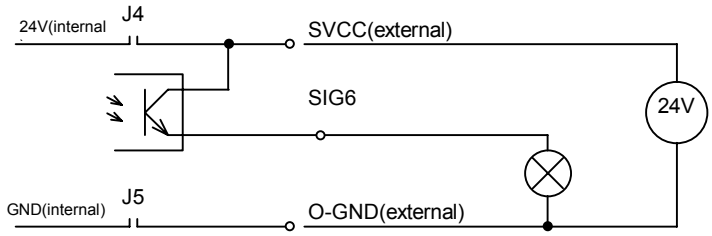
2.) maximum 4A total (limited by output driver)

5.2.4 Diagram



5.2.5 Signalization with External Control

In order to use digital outputs with external control, bridges J4 and J5 should be open. The following example shows how to connect a signal light to indicate „all results accepted“. The signal light turns on if all results are accepted.

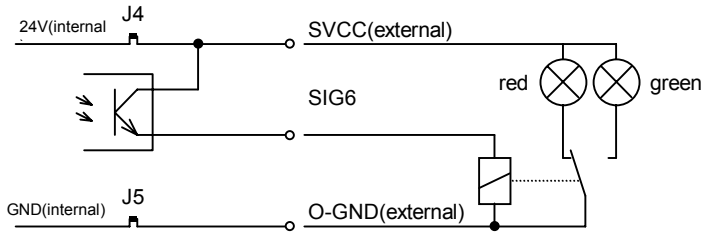


5.2.6 Signalization with Internal Control

In order to use the digital output signal with internal controls, bridges J4 and J5 should be closed.

Warning: with this configuration, the galvanic separation of the outputs does not apply.

The following example shows how to connect two signal lights (red = rejected, green = accepted). When one of the results is rejected the red signal light will light up, otherwise the green signal light will be lit.



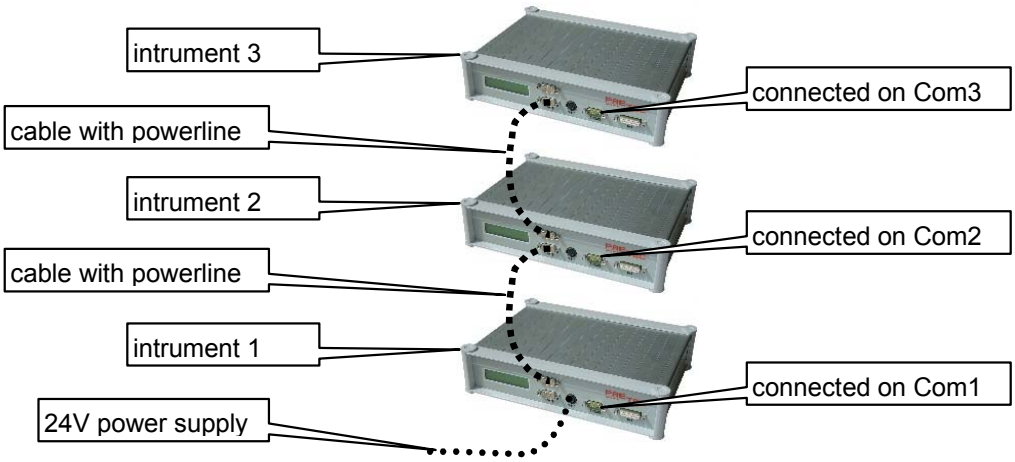
5.3 RS232 Interface

The RS232 Interface allow a communication between the user and the instrument. Over this interface, the user can send a command and get back a answer.

For optimal performance, we recommend that only the PRETEC connecting cable be used. These cables are specifically designed for industrial use and ensure stable and reliable operation of the unit.

5.3.1 Power supply with usage of instrument in RS232-mode

One power supply unit (27W) can be used for three instruments. The power can be connected over the CAN cable from each instrument to the other. For this, you should at least connect the lines on pin 3, 6, and 9. (2xGND, 1x24V), a dasy-chain standard cable may also be used.



5.3.2 Parameter for RS232

The instrument have the following variable parameter for RS232:

- Communication speed 38400, 19200, 9600Baud

The instrument have the following fixed parameter for RS232:

- 8 databit
- 2 stopbit
- no parity

5.4 CAN Interface

The CAN Interface allow a communication between the user and the instrument. Over this interface, the user can send a command and get back a answer.

For optimal performance, we recommend that only the PRETEC connecting cable be used. These cables are specifically designed for industrial use and ensure stable and reliable operation of the unit.

5.4.1 Dasy-chain of instruments

The CAN-interface is suit for communicate with more than one instrument. Theoretically it is possible to connect with the Standard ID (11Bit ID) 2048 instruments on the same bus. This is not possible with our measuring instrument, the problems around the power supply is not solved at all.

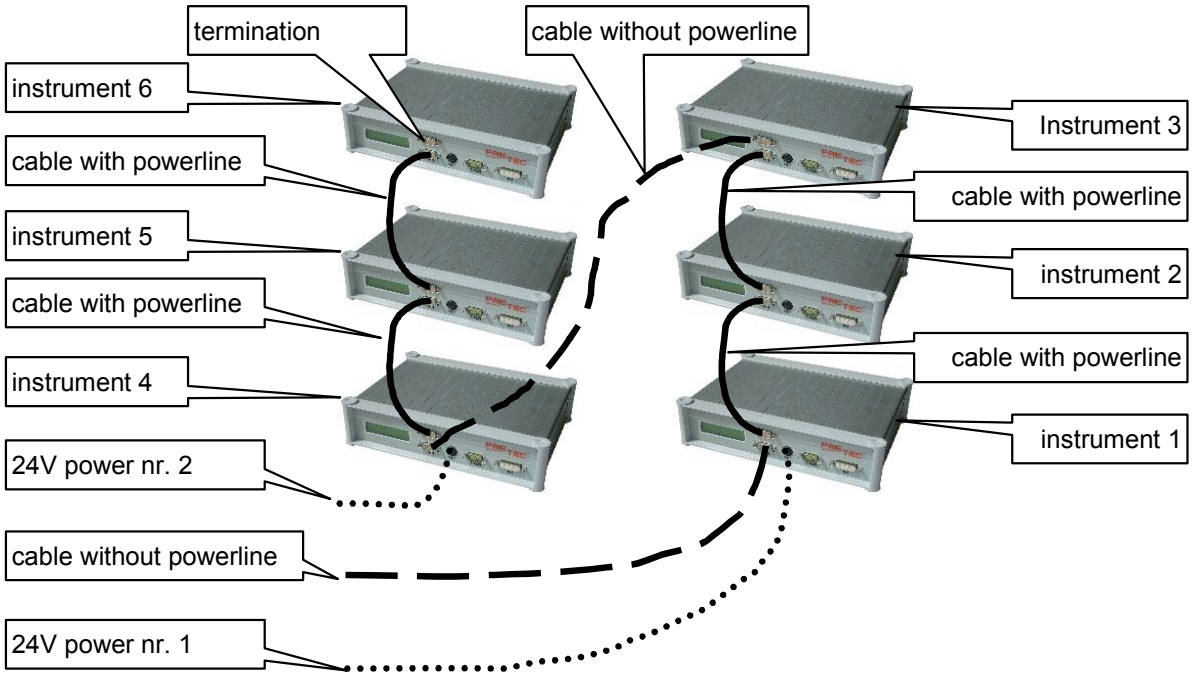
For chaining instruments you should respect the following points:

- Each instrument must have a unique Device address (see command @GB / @SB)
- All Instruments can (must not) have the same answer-address.
- Connect instruments always as dasy-chain, never as a star or a tree.
- The last instrument on the bus must have a termination.
- The external power supply (27W) allow to connect 3 instruments
- For application with more than 3 instruments us the connecting diagram on chapter 0
- The power is also given over the dasy-chain cable. The norm "Belden 102" must be respected
- The whole bus length should be (by using a speed of 500kBaud) at most 100m
- All instruments should be connected to a central grounding. This grounding should be the same as the grounding of the machine.

Respecting this points is necessary both for the safety of the operator and for reliable measurement data acquisition.

5.4.2 Power supply with usage of instrument in CAN-mode

The power connection for several instruments should be done as the following diagram shown.



5.4.3 Parameter of CAN Bus

The instrument have the following variable parameter for CAN interface:

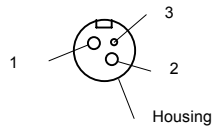
- device-address / ID (0...2048)
- answer-address / ID (0...2048)

The instrument have the following fixed parameter for CAN interface:

- transmission speed: 500kBaud
- ID: standard ID (11Bit-ID)

6 Connector assignment

6.1 24V Connector



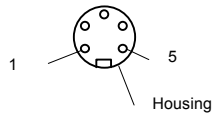
View of the back of the unit

Pin assignment:

1	24V
2	0V
3	NC

Housing = NC

6.2 Transducer Connector



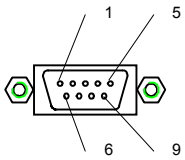
View of the back of the unit

Pin assignment:

1	Energizing VoltageSIN
2	GROUND (=DGND)
3	Signal Out
4	Detect
5	Energizing Voltage COS

Housing = GROUND

6.3 RS232 Connector

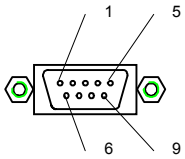


View of the back of the unit.

Pin assignments:

1	CD
2	RD
3	TD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

6.4 CAN Connector

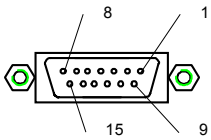


View of the back of the unit.

Pin assignments:

1	NC
2	CAN_L
3	GND
4	NC
5	NC
6	GND
7	CAN_H
8	NC
9	+24V

6.5 IO Connector



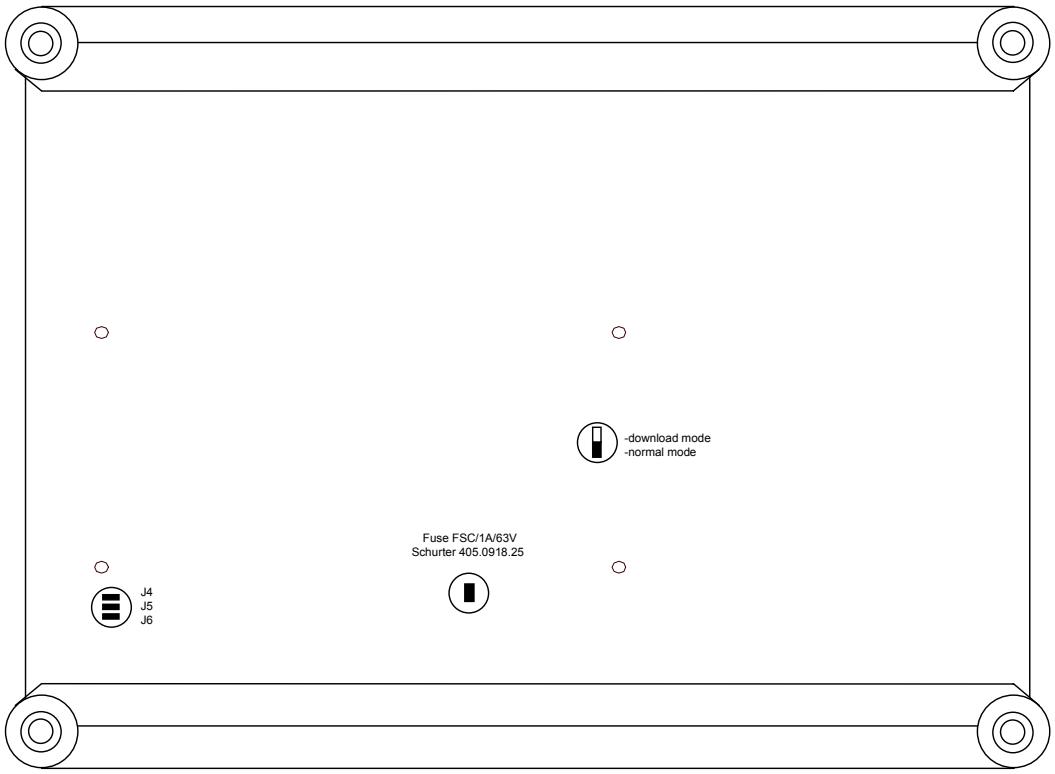
View of the back of the unit

Pin assignments:

1	Ready	9	SVCC
2	Sig 1	10	Measurements
3	Sig 2	11	Calibrate(zero set)
4	Sig 3	12	NC
5	Sig 4	13	NC
6	Sig 5	14	I-GND
7	Sig 6	15	O-GND
8	NC		

7 Service

The battery, and the complete hardware configuration are accessible to the user after the plastic cap on the bottom side has been removed.



View of the underside of the unit after the plastic cap has been removed.

7.1 Changing the fuse

To change a defective fuse:

1. Unplug the 24V power supply
2. Remove the plastic cap
3. Using a pair of fine pliers, replace the defective fuse. To position the fuse correctly, see the description on the base of the unit.
4. Replace the plastic cap.

Warning! Use only the following fuse: Type FSC/1A/63V

7.2 Download new software

The download of new application software (updates, upgrades, expanded functions) is handled through the RS232 interface.

For assistance, please contact your **PRETEC** representative.

8 ASCII characters

8.1 Non printable characters

Dez	Hex	Character	Code	Comment
0	0x00	Ctrl-@	NUL	Nullprompt
1	0x01	Ctrl-A	SOH	Startofheading
2	0x02	Ctrl-B	STX	Startoftext
3	0x03	Ctrl-C	ETX	EndofText
4	0x04	Ctrl-D	EOT	Endoftransmission
5	0x05	Ctrl-E	ENQ	Enquiry
6	0x06	Ctrl-F	ACK	Acknowledge
7	0x07	Ctrl-G	BEL	Bell
8	0x08	Ctrl-H	BS	Backspace
9	0x09	Ctrl-I	HT	Horizontaltab
10	0x0A	Ctrl-J	LF	Linefeed
11	0x0B	Ctrl-K	VT	Verticaltab
12	0x0C	Ctrl-L	FF	Formfeed
"	"	"	NP	Newpage
13	0x0D	Ctrl-M	CR	Carriagereturn
14	0x0E	Ctrl-N	SO	Shiftout
15	0x0F	Ctrl-O	SI	Shiftin
16	0x10	Ctrl-P	DLE	Datalinkescape
17	0x11	Ctrl-Q	DC1	X-ON
18	0x12	Ctrl-R	DC2	
19	0x13	Ctrl-S	DC3	X-Off
20	0x14	Ctrl-T	DC4	
21	0x15	Ctrl-U	NAK	Noachnowledge
22	0x16	Ctrl-V	SYN	Synchronousidle
23	0x17	Ctrl-W	ETB	Endtransmissionblocks
24	0x18	Ctrl-X	CAN	Cancel
25	0x19	Ctrl-Y	EM	Endofmedium
26	0x1A	Ctrl-Z	SUB	Substitute
27	0x1B	Ctrl-[	ESC	Escape
28	0x1C	Ctrl-\	FS	Fileseparator
29	0x1D	Ctrl-]	GS	Groupseparator
30	0x1E	Ctrl-^	RS	Recordseparator
31	0x1F	Ctrl-_	US	Unitseparator
127	0x7F		DEL	Deleteorrubout

8.2 Printable characters

Dez	Hex	Character	Comment
32	0x20		Leerzeichen
33	0x21	!	Ausrufungszeichen
34	0x22	"	Anführungszeichen
35	0x23	#	Doppelkreuz
36	0x24	$	Dollarzeichen
37	0x25	%	Prozentzeichen
38	0x26	&	KaufmännischesUND
39	0x27	'	Apostroph
40	0x28	(	RundeKlammerauf
41	0x29	)	RundeKlammerzu
42	0x2A	*	Stern
43	0x2B	+	Pluszeichen
44	0x2C	,	Komma
45	0x2D	-	Minuszeichen
46	0x2E	.	Punkt
47	0x2F	/	Schrägstrich(Slash)
48	0x30	0	
49	0x31	1	
50	0x32	2	
51	0x33	3	
52	0x34	4	
53	0x35	5	
54	0x36	6	
55	0x37	7	
56	0x38	8	
57	0x39	9	
58	0x3A	:	Doppelpunkt
59	0x3B	;	Semikolon
60	0x3C	<	Kleiner-als-Zeichen
61	0x3D	=	Gleichheitszeichen
62	0x3E	>	Größer-als-Zeichen
63	0x3F	?	Fragezeichen
64	0x40	@	Klammeraffe("at")
65	0x41	A	
66	0x42	B	
67	0x43	C	
68	0x44	D	
69	0x45	E	
70	0x46	F	
71	0x47	G	
72	0x48	H	
73	0x49	I	
74	0x4A	J	
75	0x4B	K	
76	0x4C	L	
77	0x4D	M	
78	0x4E	N	
79	0x4F	O	
80	0x50	P	
81	0x51	Q	
82	0x52	R	
83	0x53	S	
84	0x54	T	
85	0x55	U	
86	0x56	V	
87	0x57	W	
88	0x58	X	
89	0x59	Y	
90	0x5A	Z	
91	0x5B	[	EckigeKlammerauf
92	0x5C	\	UmgekehrterSchrägstrich
			(Backslash)
93	0x5D	]	EckigeKlammerzu
94	0x5E	^	Caret(Hut)
95	0x5F	_	Unterstrich
96	0x60	`	"Backquote"
97	0x61	a	
98	0x62	b	
99	0x63	c	
100	0x64	d	
101	0x65	e	
102	0x66	f	
103	0x67	g	
104	0x68	h	
105	0x69	i	
106	0x6A	j	
107	0x6B	k	
108	0x6C	l	
109	0x6D	m	
110	0x6E	n	
111	0x6F	o	
112	0x70	p	
113	0x71	q	
114	0x72	r	
115	0x73	s	
116	0x74	t	
117	0x75	u	
118	0x76	v	
119	0x77	w	
120	0x78	x	
121	0x79	y	
122	0x7A	z	
123	0x7B	{	
124	0x7C		
125	0x7D	}	
126	0x7E	~	

9 Troubleshooting

Problem	Possible Cause/Solution
Unreasonable measured values	Wrong type of probe e.g. LVDT, only half bridge with Tesa sensitivity are accepted
Unit will not boot in standby mode	Remove all external connections (RS, CAN and IO) Try turning the unit on again. If the unit still fails to turn on, the fuse, the unit itself, or the AC adaptor may be defective. A further possibility would be a short in a connector that may prevent the unit from functioning. (Until the short in the connector has been cleared, the AC adapter has reduced the voltage being delivered to the unit)
The unit locks up by probe set up or connection of RS232	Check if the unit ground is connected to the machine ground and the machine is properly grounded

10 Notes