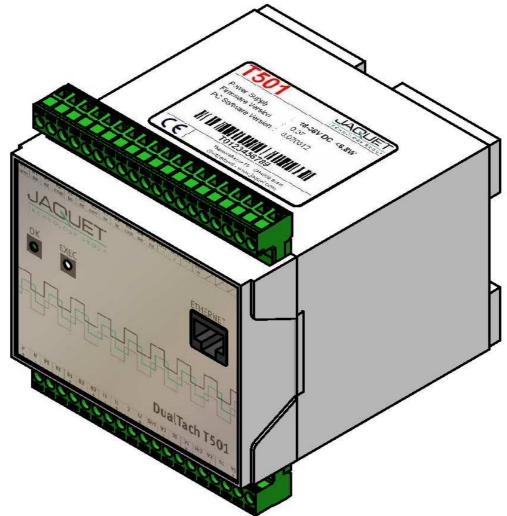


# **Frequency Measurement and Switching Instrument** DualTach T501

Instruction Manual Version 2.00E



**T501 :** 2 Channel Tachometer with 4 Relays and 2 Analog Outputs 0/4-20mA **T501.50:** Part No.: 384Z-05600 (AC Version) **T501.10:** Part No.: 384Z-05601 (DC Version)

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# 1 Safety notice

T501 Series tachometers may only be connected by competent personnel.

T501 tachometers do not generate dangerous potentials but as soon as circuits exhibiting dangerous potentials are connected, then these may be present in the tachometer circuits.

The Tachometers may only be opened for repair by trained personnel.

These Instruments correspond to protection class I. The PE terminal must therefore be earthed.

The instructions in this manual must be strictly adhered to.

Not following these instructions could result in damage to equipment or plant and injury to personnel, as well as negating warranty claims!

Units that have suffered electrical over load, mechanical stress or been operated outside of specification must be immediately switched off and returned to the manufacturer for repair.



# 2 Product features

Series T501 tachometers measure and monitor frequency signals (speed proportional values) in the range 0.025Hz to 50,000Hz.

Available are:

- 2 Frequency Inputs (Speed sensors)
- 2 Analog outputs
- 2 Binary input
- 4 Relays
- 2 Open Collector Outputs
- 4 Parameter sets each having 6 System limits with 4 Limit values
- Sensor monitoring
- System monitoring

The Tachometers are configured via Computer (PC) using resident operating software.

2 models are available:

**T501:** 2 channel Tachometer with 4 Relays and 2 Analog outputs 0/4-20mA **T501.50:** Part No.: 384Z-05600 (AC Version) **T501.10:** Part No.: 384Z-05601 (DC Version)

# **3** Specifications

Reference temp: + 20 °C

## 3.1 General

Measurement time	2ms / 5ms / 10ms / 20ms / 50ms / 100ms / 200ms / 500ms / 1s / 2s / 5s (Frequency measurements might take longer than the predefined measurement time)				
Supply voltage	AC Version		90264 VAC (4763 Hz) / 1	120VDC 370VDC	
	DC Version		1836 VDC		
Isolation voltage	AC Version		3000 VAC (from AC/DC pov	wer supply)	
	AC Version		1500 VDC (from DC/DC co	nverter)	
Isolation	Galvanic isolat	tion betwee	n:		
	<ul> <li>Supply</li> </ul>				
	Sensor inp	out incl. sen	sor supply		
	Binary inp	ut 1			
	Binary inp	ut 2			
	<ul> <li>Analog ou</li> </ul>	tput 1			
	Analog ou	tput 2			
	Relay outputs				
	Open Coll	Open Collector output 1			
Open Collector output 2			2		
	Ethernet interface				
Power consumption			P Min. (W)	P Max. (W)	
		18 VDC	3.3	6.6	
	DC Version	24 VDC	3.4	6.7	
		36 VDC	3.5	6.8	
	AC Version	110 VAC	5.0	11.0	
		230 VAC	8.0	14.0	
Power supply bridging		18 VDC			
	DC Version	24 VDC	> 20ms		
		36 VDC			
	AC Version	110 VAC 230 VAC	> 20ms		
Operating temperature	AC Version		-25℃+50℃		
	DC Version		-40℃…+70℃		
Storage temperature	AC Version		-40℃…+85℃		
	DC Version				
Weight	AC Version		430g		
	DC Version		390g		
Sealing to DIN EN 60529	IP 20				

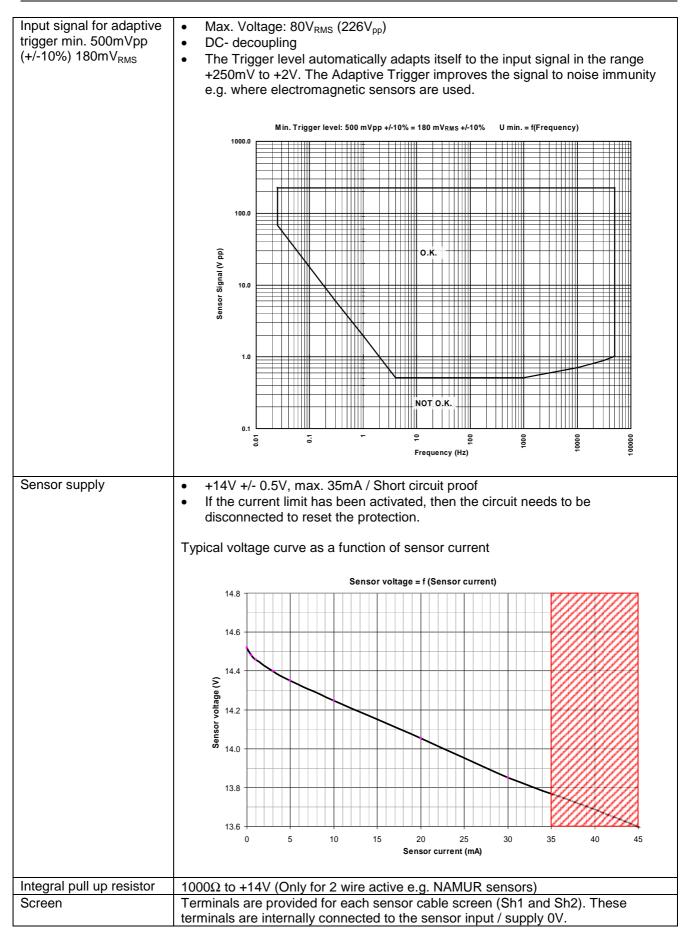
# 3.2 Inputs

## 3.2.1 Sensor Inputs

An overview how different sensor can be connected is in chapter 6.1.2 Terminal A

Number	2
Frequency range (-3dB)	0.025 Hz 50 KHz
Measurement range	Programmable within the frequency range
Measurement accuracy	0.002 %
Resolution (Frequency)	10 ns

Input impedance	> 11.5 kΩ		
	$(0.1 \text{ Hz} \rightarrow 80 \text{ k}\Omega, 1 \text{ KHz} \rightarrow 18.5 \text{ k}\Omega, 10 \text{ KHz} \rightarrow 16 \text{ k}\Omega, 50 \text{ KHz} \rightarrow 11.6 \text{ k}\Omega)$		
Input signal for fixed 3V trigger (+/-15%) Input signal for adaptive trigger min. 57mVpp (+/-10%) 20mV <sub>RMS</sub>	<ul> <li>Max. Voltage: 80V<sub>RMS</sub> (226V<sub>pp</sub>)</li> <li>Best suited to digital signals</li> <li>Schmitt Trigger Input (Hysteresis &gt; 1V)</li> <li>"0" = Low Level to 1.25V</li> <li>"1" = High level from 3V (+/- 15%)</li> <li>Min. Pulse width: 5µs</li> <li>NO DC- decoupling</li> <li>Max. Voltage: 80V<sub>RMS</sub> (226V<sub>pp</sub>)</li> <li>DC- decoupling</li> <li>The Trigger level automatically adapts itself to the input signal in the range +28.5mV to +2V. The Adaptive Trigger improves the signal to noise immunity</li> </ul>		
	e.g. where electromagnetic sensors are used.		
	Based Signal (VD)		
	0.10 0.10 0.01		



Sensor monitoring	3 sensor monitoring settings are available in the configuration software:
	<ul> <li>No Sensor Monitoring</li> <li>Monitoring of supplied sensors (active Sensor Types) [Also for 2 wire sensors that are supplied via the internal Pull-up resistor (1kΩ) → Sensors drawing current outside of I<sub>min</sub> or I<sub>max</sub> are considered to be faulty. I<sub>min</sub> = 0.535mA I<sub>max</sub> = 0.535mA</li> <li>Monitoring of non powered sensors (passive Sensor Types) [For 2 wire sensors such as electromagnetic sensors.] → The sensor is considered to be faulty if the line is broken. Here the sensor impedance is dynamically measured.</li> </ul>
	$Z < 60 k\Omega = OK$ Z > 125 kΩ = NOT OK

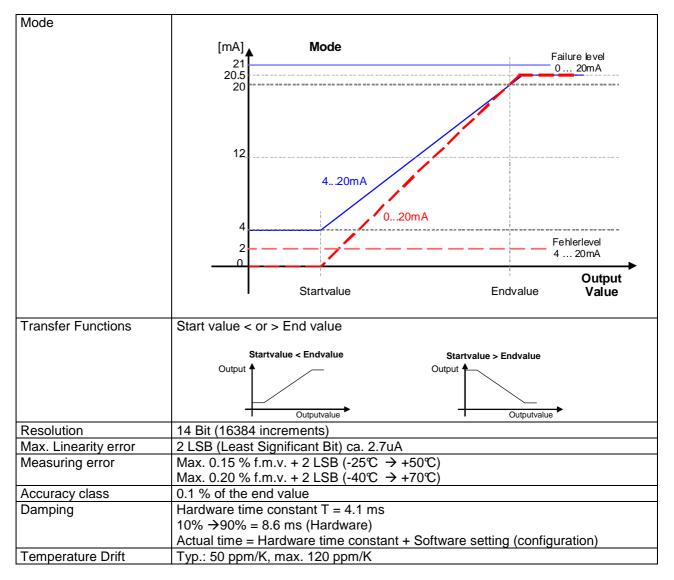
# 3.3 Binary Inputs

Number	2 Active Binary Inputs and 1 push button (EXEC – logic OR with Binary input B1)
Level	Logic 0 = 0V+5V
	Logic 1 = +15V+36V
Isolation voltage	1500 V <sub>RMS</sub>
Input resistance	$R_{min} = 8.2 \text{ k}\Omega$

# 3.4 Outputs

# 3.4.1 Analog Outputs

Number	2 Analog outputs
Isolation voltage	1000 VDC
Output type	Current (selectable 020 / 420mA)
Load	Max. 500Ω
Open circuit voltage	Max. 15V
Typical error curve	CLASS 0.1 % (from End Value) 0.2 % (from measured value) + 2 LSB 0.2 % (from measur



## 3.4.2 Relays Outputs

Number	4			
Туре	Mono-stable single of	change-over		
Functions	2, dynamic error	r, always on or off. Hold function (Reset via E	ensor Alarm, Static error Se Binary input)	ensor 1 or
Relay - max. switching	1000			
current		DC Resistive Load 0.1 Contact 0	AC Resistive Lo	ad 10

Reaction time	Effective Measurement interval + max 6 ms	
Contact resistance	50 m $\Omega$ Max. (Initial contact)	
Contact isolation	1500 VAC (coil to contact)	
	1000 VAC (between open contacts)	

## 3.4.3 Open Collector Outputs

Number	2 Open Collector outputs
Туре	Opto-coupler (passive)
External resistance	IC nominal = 15mA ( $R_{Pull-up} = V / I$ ) Example: $V = 24 V \rightarrow R = 1.6 k\Omega$
	IC max. = 30mA
Reaction time	As Frequency output: <30 us
	Effective Measurement interval + max 30 us
Load voltage	V = 5VDC36VDC
Isolation voltage	1500 VAC
Functions	• May be assigned to System Limit 16, Sensor Alarm, Static error Sensor 1 or 2, dynamic error, always on or off.
	With or without Hold function (Reset via Binary input)
	• Frequency Sensor 1 or 2, Frequency x2, Frequency x4 (subject to phase shift)
	Fail Safe or Not Fail Safe
Inverting	Open collector output frequencies are in phase with the input signal.

# 3.5 Data communication

### 3.5.1 Ethernet

Number	1
Physical Layer	Ethernet 10Base-T, IEEE 802.3i
Max cable length	100 m
Transmission rate	10 MBit/s
Connection	Front panel, 8P8C (RJ45)
Usage	Configuration and measurement status
Protocol	Peer to Peer
Connecting cable	Use a crossover cable

# 3.6 Environment

### **3.6.1 Climatic Conditions**

Standard	DIN 40 040
Operating temperature	See 3.1 General
Storage temperature	See 3.1 General
Relative Humidity	• 75% average over 1 year; to 90% for max. 30 days.
	Condensation to be avoided.

# 3.6.2 Electromagnetic immunity

Electrostatic discharge	EN 61000-4-2	Contact 6 kV, air 8 kV
Electromagnetic fields	EN 61000-4-3	30 V/m, not modulated and AM 80 % with 1000Hz Sinus wave
Fast transients	EN 61000-4-4	2 kV, repeated 5 kHz duration 15 ms period 300 ms
Slow transients	EN 61000-4-5	Line / line +/- 1kV, earth line +/- 2kV, 1 per minute
Conducted HF	EN 61000-4-6	3 V eff (180 dBuV) 10 kHz – 80 MHz
Mains frequency Magnetic field	EN 61000-4-8	50 Hz, 100 A/m 2 minutes
Voltage dips	EN 61000-4-11	Voltage dips, short interruptions and voltage variations immunity tests

## 3.6.3 Other Standards

Communauté Européenne

# 4 **Principle of Operation**

# 4.1 General

The T501 Series of tachometers are microprocessor controlled and operate in accordance with the period measurement principle whereby the duration of the input period is measured during the measurement interval. The reciprocal value based on the average input period corresponds to frequency and hence speed. The relationship between frequency and speed is determined by the Machine Factor.

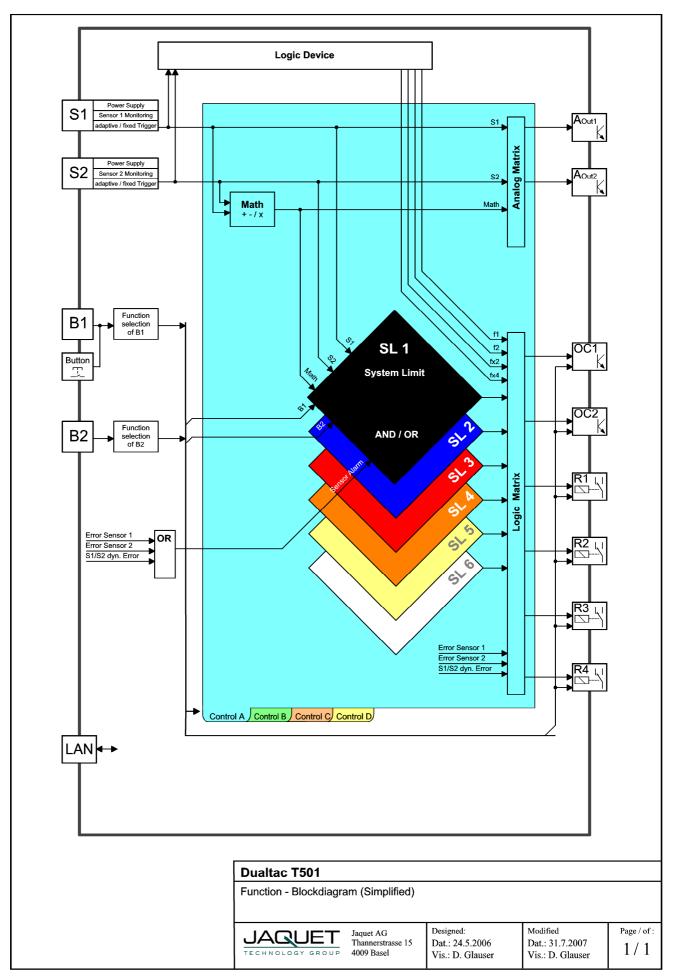
The status of System Limits is based on various inputs that can be logically combined AND or OR. System Limit inputs may be: both speed inputs, a Math function based on the speed inputs and, the 2 binary inputs. A hysteresis may be set for the speed inputs and Math function individually. The 6 System Limits in each of 4 parameter sets may be individually defined. Parameter sets may be selected via binary inputs. The 4 relays and 2 open collector outputs may be assigned to any System Limit and will react accordingly. The 2 open collectors may alternatively be assigned to frequency x1, x2 or x4. Relay and open collector status may be latched and then reset via binary input.

The system permanently monitors itself. Sensors may in addition be monitored. Sensor error may be used in the configuration to influence System Limits. System error would influence the relays, open collectors and Analog outputs and the front panel LED would go out.

Frequency Outputs (Open Collector Outputs) are not influenced by the Machine factor but where so defined correspond to the input signal. For frequency x2 or x4 the 2 input signals should ideally be phase shifted by 90 degrees.

Parameter input is via resident PC software and the Ethernet Interface. This may also be used to interrogate the unit, display measurement and unit status.

The Parameters are safely stored in EEPROM.



### 4.2 Machine factor

The Machine factor determines the relationship between the measured sensor frequency and the corresponding speed.

$M = \frac{f}{f}$	M f		Machine factor Signal frequency at Machine speed n
n	n	=	Machine speed

There are two means of determining this value:

### 4.2.1 Measured

Where the Frequency (f) at the Sensor input and the corresponding speed (n) is known:

$M = \frac{f}{n}$ $M = Machine factor$ $f = Signal frequency at known speed$ $n = Machine speed at measured Signal frequency$	
---	--

### 4.2.2 Calculated

The relationship between Sensor Signal Frequency (f) and speed (n) at a Pole wheel is:

$f_{n \times p}$	f	=	Signal frequency in Hz
/ _ <u>_</u>	n	=	Pole wheel speed in U/min (rpm)
° 60	р	=	Number of teeth

Machine factor is then:

$M = \frac{p}{60}$			Machine factor Number of teeth
--------------------	--	--	-----------------------------------

Should a gearbox be present between the pole wheel and drive shaft the formula becomes:

$M = \frac{p \times i}{1 + 1}$	М	=	Machine factor
<i>III</i> –	р	=	Number of teeth
60	i	=	Gearbox ratio

The gearbox ratio is determined as follows:

$n_1 p_2$	i	=	Gearbox ratio
$i = \frac{n_1}{2} = \frac{p_2}{2}$	n <sub>1</sub>	=	Primary pole wheel speed (Sensor position)
$n_2 p_1$	n <sub>2</sub>	=	Secondary pole wheel speed (Speed to be indicated)
2 1	p1	=	Nr. Of teeth – primary pole wheel
	<b>p</b> <sub>2</sub>	=	Nr. Of teeth – secondary pole wheel

### 4.2.3 Other physical parameters

In principle any parameter may be processed as long as it can be translated into a frequency proportional value. The formulae above may still be applied whereby the required parameter is used in place of speed.

# 5 Installation

Series T501 tachometers may only be installed by competent personnel. Only undamaged and correctly configured units may be used. Please note the safety instructions in Paragraph 1. They should be connected to the power supply by means of an isolating switch and correspond to protection class I. The PE terminal must therefore be earthed.

Before switching on check that the supply is within the permissible range.

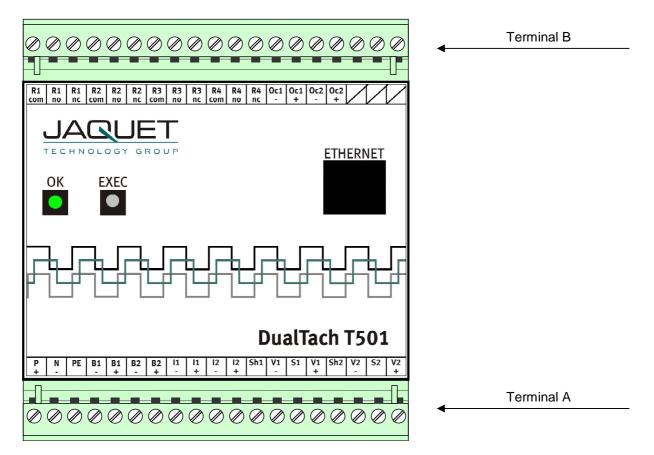
The Sensor cable screens must be connected terminals "Sh1" and "Sh2" respectively so as to minimize the effects of signal noise. These terminals are internally connected with 0V (not PE).

**Attention:** If the password has been changed, there is no way of returning to a factory setup. If the password is forgotten, you have to send in the tachometer and the Jaquet- Service- Team will set it back.

# 6 Connections

# 6.1 Front view

### 6.1.1 Front view T501



The Ethernet Interface, status LED along with the EXEC push buttong are located at the front. For communications please see Paragraph 7 Configuration via PC Software

## 6.1.2 Terminal A

#### Supply

N (-)	: Neutral (Return)
P (+)	: Live
PE	: Earth

#### Sensor connections S1 / S2

S1	: Sensor input S1
Sh1	: Screen S1
V1+	: Sensor Supply S1
V1-	: 0V S1
S2	: Sensor input S2
Sh2	: Screen S2
V2+	: Sensor Supply S2
1/0	.01/60

V2-: 0V S2

#### **Binary Inputs**

B1+	: positive B1
B1-	: negative B1

B2+ : positive B2

B2-: negative B2

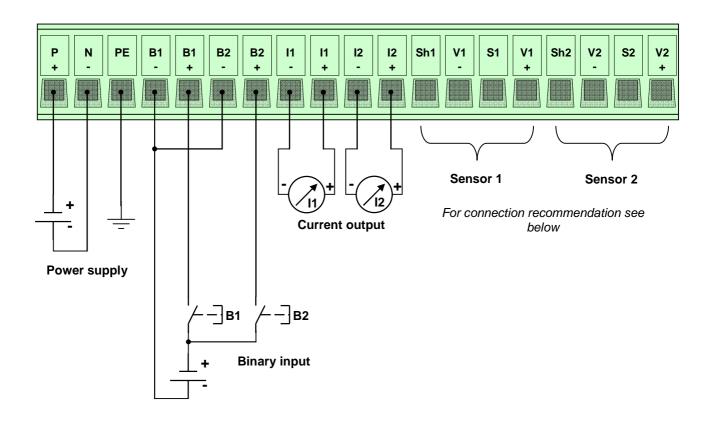
#### Analog outputs

11+	: positive I1
	•

11-: negative I1

12+ : positive I2

: negative I2 12-



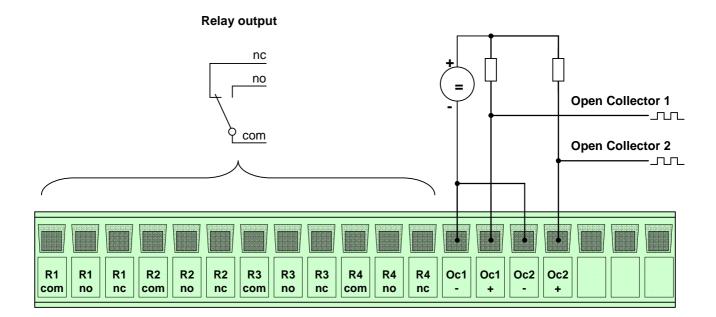
#### **Connection recommendation** V1 Sh1 V1 **S1** Terminal for Sensor 1 + ę Sh2 V2 S2 V2 Terminal for Sensor 2 + , ę e • Sensor types electromagnetic 2-wire Sensors (DSE..., Green Line E...) or 00 ŏ Č 企 Ferostatische Sensoren (2 Draht) (DSF..., NAMUR) or 00 ŏ Sensors with NPN- output (Open Collector) (DSF..., DSD...) С S ₹/ $\mathbf{\Phi}$ Sensors with amplifier and fixed Trigger level at 1,25/3,0 Volt (DC) (DSF..., DSD..., Greenline F..., D..., Y... ) Ó ∕Ո configuration recommendation of the Software parameters Sensor 1 Internal pull up resistor **Current monitoring Trigger level** Type opwered (active) not used min: mA • fixed 3 V adaptive min 57 mVpp not powered (passive) 🔾 used max: mA adaptive min 500 mVpp

#### **Open Collector Outputs Oc1 / Oc2**

- Oc1+ : positive Open Collector 1 (Emitter)
- Oc1- : negative Open Collector 1 (Collector)
- Oc2+ : positive Open Collector 2 (Emitter)
- Oc2- : negative Open Collector 2 (Collector)

#### **Relay Outputs R1-R4**

- NC : Normally closed
- NO : Normally open
- Com : Common



# 7 Configuration via PC Software

# 7.1 Software Concept

The T501 Ethernet connection is used to configure or interrogate the unit. (see Paragraph 10 Accessories) The resident menu driven configuration software is used for unit set up.

Normal PC file handling procedures apply and the configuration file can be communicated between computer and T501.

To run the Software you must have Java Runtime Environment (JRE) 1.5 or higher.

# 7.2 PC Settings

The PC Ethernet card must first be set correctly. T501's cannot be used on a network.

Go to Desktop, Settings, Network connections and right click on <Properties>. Right click the Network card you want to use for T501 comms and select <Properties>.

General Advanced					
Connect using:					
\mu Broadcom NetXtreme 57xx Gigabit C	Configure				
This connection uses the following items:					
Client for Microsoft Networks					
🗹 📇 Deterministic Network Enhancer					
File and Printer Sharing for Microsoft Networks					
Marchinet Protocol (TCP/IP)					
Install Uninstall	Properties				
Description					
Transmission Control Protocol/Internet Protoc	ol. The default				
wide area network protocol that provides con	munication				
across diverse interconnected networks.					
Show icon in notification area when connec	tod				
<ul> <li>Notify me when this connection has limited of</li> </ul>					
I would be when a is connection has inneed a	in the connectivity				
	L Court				
OK	Cancel				

Select Internet protocol (TCP/IP) and select the Option <IP-Address automatically recognize>

	d automatically if your network supports ed to ask your network administrator for
<ul> <li>Obtain an IP address autor</li> </ul>	natically
C Use the following IP addres	
IP address:	
Subnet mask:	1 12 14 14 14
Default gateway.	· · · · · ·
Obtain DNS server address     Use the following DNS server     Preferred DNS server.	
Alternate DNS server.	
	Advanced
	OK Cance

## 7.3 Download configuration software

Connect the Tachometer to your PC using a cross over patch cable. Once connected open your browser and enter the IP address 192.168.1.127/software

An HTML page will open with the Link <Download control programm>

Click on the Link. Dependent upon your Internet Explorer configuration you will be asked whether you want to <Open> (Run) or <Save> (Save as) the programme.

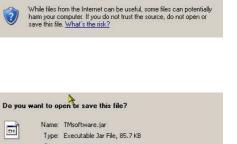
### 7.3.1 Direct execution

Select <Open> and the configuration will be read from the tachometer (can take a few seconds). Once loaded the configuration software will open automatically.

### 7.3.2 Save as

Select <Save> to save the file in a path of your choice (can take a few seconds).

Open the file from your PC. The configuration software establishes a connection to the T501 and reads the actual parameters.



/ 🗠 💌 💭 / 🏸
p://192.168.1.127/software

File Edit View Favorites Tools Help

#### JAQUET TECHNOLOGY GROUP

2 Channel Tachometer T500 set	ries
Download control programm	

Do you want to open or save this file?

☑ Always ask before opening this type of file

284

Name: TMsoftware.jar

Type: Executable Jar File, 85.7 KB From: 192.168.1.127

Open

Save

Cancel

Type: Executable Jar File, 85.7 KB From: 192.168.1.127 Open Save Cancel	284	Name:	TMsoftware.jar
Dpen Save Cancel		22.00	
Open Save Cancel		From:	192.168.1.127
Open Save Cancel			
			Open Save Cancel
Always ask before opening this type of file	Alway	s ask before	e opening this type of file

# 7.4 Configuration software

### 7.4.1 Configuration user and Process user

T501 parameters are divided into 2 groups, Configuration and Process parameters. When the programme is started the window shows 3 levels one can log into, Config user, Process user or Guest. Process and Configuration users require passwords.

As a Guest one only has the right to view measured data or print out actual parameters.

A Process user can perform Guest functions and view and change Process parameters.

The Configuration user has full access and control over all Parameters, Process as well as Configuration.

The factory settings are shown below **Bold**.

### 7.4.2 Log in

Here you can Log in on three different levels. The standart passwords for Config- and Process- User are:

Config user password	1981
Process user password	1977

🚔 Jaquet Technology Group - Online - T501 - Guest	xo.
File Online Configuration Settings Info	
Configuration software of	of T501
Process ID:	
Login As:	Config user
Login As:	Process user
	Guest
	ок
JAQUET AG - Thannerstrasse 15 - 4009 B	tasel - Switzerland - www.jaquet.com - Tel: +41 61 306 88 22

## 7.4.3 Main window and System Limit Matrix

After successfully logging in you will see the main window used for displaying system and measurement status.

On the left the various System Limit inputs are listed. In the middle the System Limit and alarm status are shown and on the right all outputs and current levels can be seen.

In the middle is a bar called System limit Matrix. Click on this and an overview of the logical status of System Limits, binary inputs and sensor error is shown.

ile Online Co	nfiguration Settings Info				
Actual input dat	a	Status		Actual output value	
Speed value		Active control		Analog output	
Sensor 1	1500.00	Control A		Analog output 1	16.000 mA
Sensor 2	1500.01	System limits		Analog output 2	16.000 mA
Math value		System Limit 1	@ active	Relay status	
S1-S2	0.00000	System Limit 2	( active	Relay 1	(energised)
		System Limit 3	() inactive	Relay 2	(energised)
Binary input		System Limit 4	() inactive	Relay 3	O de-energised
Binary 1	O deactivated	System Limit 5	O inactive	Relay 4	O de-energised
Binary 2	O deactivated	System Limit 6	O inactive	Open collector sta	trat
		System limi	t matrix	Open collector 1	frequency
		Alarm messages		Open collector 2	Interpretation (%) (%) (%) (%) (%) (%) (%) (%) (%) (%)
		System	O OK		
		Sensor	O OK		
		Static monitor S1	O OK		
		Static monitor S2	O OK		
		Dynamic monitor	O 0k		
		Refresh			
		Refresh status	roading data		

		D	letails of	í system	limits			
		'	Activ cor	strel: Con	ntrol A			
	SL 1	SL 2	SL 3	SL 4	SL 5	SL 6	Actual in	out data
System limit status	۲	۲						
Limit sensor 1	۲	۲	۲	۲	۲	۲	Sensor 1	1500.00
Limit sensor 2	۲	۲	۲	۲	۲	۲	Sensor 2	1500.00
Limit math							Math value	0.00000
Binary input 1								
Binary input 2								
Sensor alarm								

# 7.4.4 Logging in and out

To change user level log out via <File> and click on <Log out>, then log in again using the appropriate password.

📥 Ja	🚔 Jaquet Technology Group - Online - T501 - C						
File	Online	Configuration	Settings	Info			
Nev Ope	-	lata					
Sav Prir	/e as nt						
Log	jout						
Off	ine						
Exit	t						

## 7.5 Configuration file...

### 7.5.1 ... creating new

To create a new configuration file go to <File>, <New> and click on OK. All parameters are then reset.

 $\ensuremath{\textbf{NB}}\xspace$ : if you have not saved the live parameters then they would be lost.

🛓 Ja	aquet Teo	hnology Group	- Online - T	501 - Co
File	Online	Configuration	Settings	Info
Nev	N	lata		
Ope	en			
Sav	/e as			
Prir	nt			
Log	jout			
Offl	ine			
Exit	t			
L				

## 7.5.2 ... resetting to factory default

To reset parameters to factory settings go to <Settings> <Back to factory setup> then click on OK.

**NB**: if you have not saved the live parameters then they would be lost.

Settings	Info	-
Refresh Interface		
	Config user password Process user password	
Display		5
Back to t	factory setup	11
Languag	ie 🕨	12

### 7.5.3 ... loading

To load an existing file go to <File>, <Open> and select the required configuration file.

**NB**: if you have not saved the live parameters then they would be lost.

絭 Jaquet Technology Group - Online - T501 - Cor							
File	Online	Configuration	Settings	Info			
Nev	N	lata					
Ope	en						
Sav	/e as						
Prir	nt						
Log	jout						
Off	ine						
Exit	t						

To save actual parameters go to <File>, <Save as> and choose the path and file name you want to use. Please note that the file name ends in the format \*.T501.

絭 Jaquet Technology Group - Online - T501 - Co							
File	Online	Configuration	Settings	Info			
Nev Ope		lata					
Sav	/e as						
Prir	nt						
Log	jout						
Off	line						
Exit	t						

## 7.5.5 ... printout

To print actual parameters go to <File>, <Print> and choose your printer. 9 pages will be printed.

≜ Jaquet Teo	hnology Group	- Online - T	50
File Online	Configuration	Settings	Ir
New Open	lata		
Save as			
Print			
Logout Offline			
Exit			

# 7.6 Communication with the Tachometer

### 7.6.1 Read measured data

under <Settings>, <Refresh Interval>.

1/4 Second

1/2 Second

1 Second

5 Seconds

measure data>.

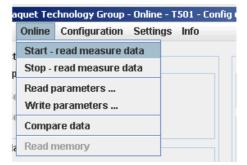
10 Seconds

2 ½ Seconds

To read actual measured data and unit status go to <Online>, <Start – read measure data>.

Measured data is updated in the Main window with interval defined

To end the measured data display go to <Online>, <Stop - read



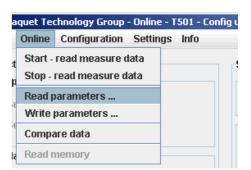
- T501 - Config use Settings Info **Refresh interval** 1/4 second 1/2 second Interface... • 1 second Change Config user password ○ 2 1/2 seconds Change Process user password 5 seconds Display 10 seconds Back to factory setup / macuv . Language O inactive

a	quet Teo	:hnology Group - Online	: - T	501 -	Соп	ifig u
	Online	Configuration Settin	gs	Info		
t	Start -	read measure data				-
1	Stop -	read measure data				
	Read p	arameters				
ľ	Write	parameters				l
e	Compa	are data				[
2	Read n	петогу				

## 7.6.2 Reading configuration from the T501

When the configuration software is started the configuration file is automatically transferred to the PC. To up load the file again go to <Online>, <Read parameters> and confirm with Enter.

NB: The live parameter data will be overwritten.



## 7.6.3 Writing a configuration to the T501

When a new configuration file is ready it can be downloaded into the tachometer. Go to <Online>, <Write Parameters> Enter. The new Parameters are then transferred to the Tachometer (can take 10s.). If no connection can be established this will be aborted after 3 attempts.

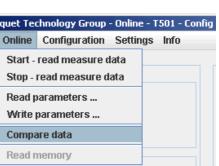
NB: The actual file in the tachometer will be overwritten.

### 7.6.4 Compare data

If you would like to compare a PC configuration file with that in the T501, first open the file and then go to <Online>, <Compare Data>. The actual file is then uploaded from the T501 and compared with the software parameters. A dialogue window will then appear showing whether the files are identical or not.

aquet Technology Group - Online - T501 - Config u Online Configuration Settings Info Start - read measure data Stop - read measure data Read parameters ... Write parameters ... Compare data Read memory

a	quet Teo	:hnology Group - Online	- T501 - Config
	Online	Configuration Setting	js Info
t	Start -	read measure data	
þ	Stop -	read measure data	
	Read p	arameters	
Ľ	Write	parameters	
٩	Compa	are data	
2	Read r	nemory	



# 7.7 Configuring

The factory defaults are written in **bold**.

### 7.7.1 Speed sensors

Go to <Configuration>, <Sensor>.

To connect the sensor see Paragraph 6 Connections.

5 Parameters are used to configure the sensor:

Туре:	powered / not powered
Resistor:	activated / deactivated
Min. current:	<b>0.5</b> mA 35mA
Max. current:	0.5mA <b>35</b> mA
Trigger level:	fixed 3V / min 57mV $_{\rm pp}$ / min 500mV $_{\rm pp}$

#### Sensor Type

Powered:	The sensor is supplied from the Tachometer's
	14V (+/-0.5V) supply. To use static sensor
	monitoring the Min/Max current consumption must
	be defined.

Not powered: The sensor is not powered by the T501 and no static monitoring is possible.

#### Internal pull up resistor

Deactivated:	The internal	null un	is no	t in circuit
Dououvatoa.		թաո աթ	10 110	c in on our.

Activated: The internal pull up is in circuit.

#### **Current monitoring**

When the sensor is supplied from the tachometer upper and lower current limits must be entered. Current consumption outside of the defined limits results in a static sensor error being signaled.

#### **Trigger level**

One of 3 modes may be selected. Fixed Trigger (fixed 3V) for digital sensors and two adaptive Triggers (57 mV<sub>pp</sub> / 500 mV<sub>pp</sub>) for Analog speed sensors (electromagnetic).

	Configuration	Settings	Info	
u Bi	Sensor		Statu	
	Binary		Activ	50
	Measurement	t time	, ACAI	~
	Sensor alarm			
1	System		Sust	om

Туре	Internal pull up resistor	Current	monitori	ng	Trigger level
e powered (active)	not used	min :	0.5	mA	⊖ fixed 3 V
<ul> <li>not powered (passive)</li> </ul>	used	max:	35.0	mA	adaptive min 57 mVpp
					adaptive min 500 mVpp
Sensor 2					
Type	Internal pull up resistor	Current	monitori	ng	Trigger level
powered (active)	not used	min :		mA	⊖ fixed 3 V
not powered (passive)	O used	max:		mA	<ul> <li>adaptive min 57 mVpp</li> </ul>

vp.	e		

T

e powered (active)

🔘 not powered (passive)

Inte	rnal pull up res	sistor
not used		
0	used	
Curr	ent monitorin	g

min :	0.5	mA
max:	35.0	mA

Trigger level	Trigger	level	
---------------	---------	-------	--

)	fixed	3 V	

adaptive min 57 mVpp

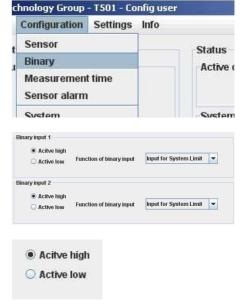
adaptive min 500 mVpp

## 7.7.2 Binary input configuration

To configure binary inputs go to <Configuration>, <Binary>.

The following options are available for each binary input:

Logic level: Active high / Active low Function of binary input: Input for System Limit / Selection of Control (A/B) (C/D) / Reset latch



#### Logic level definition

Active High: Logic 1 = binary input 15V ...33V

Active Low: Logic 1 = binary input 0V ... 5V

#### Binary input for

System Limit input:

Binary input is a constituent part of System Limits.

Parameter set selection:

Binary inputs select the parameter set (PS), see Paragraph 8.3.2 Parameter sets A, B, C and D

#### Reset latch:

Binary input resets the relays and open collectors.

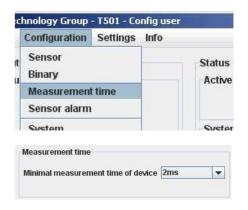
### 7.7.3 Set Measurement Interval

Go to <Configuration>, <Measurement time>.

This time interval determines the period during which the speed, parameters, status and outputs are recalculated and set accordingly.

Measurement time: **2ms** / 5ms / 10ms / 20ms / 50ms / 100ms / 200ms / 500ms / 1s / 2s / 5s

Function of binary input	Input for System Limit	•
	Input for System Limit	
	Selection of Control A/B	
	Reset latch	



### 7.7.4 Sensor alarm

Go to <Configuration>, <Sensor alarm>.

There are 3 sources of errors which may be ORed together. Each error source may be included or excluded.

Static error sensor 1:	On / <b>Off</b>
Static error sensor 2:	On / <b>Off</b>
Dynamic error:	On / <b>Off</b>

Box checked = On, unchecked = Off (see also Paragraph 7.7.1 Speed sensors).

Dynamic Error can only be used when 2 sensors are present. (see Paragraph 7.7.6 Dynamic Error).

### 7.7.5 Machine factor

Go to <Configuration>, <System>.

The Machine factor establishes the relationship between sensor frequency and associated machine speed. (see Paragraph 4.2 Machine factor)

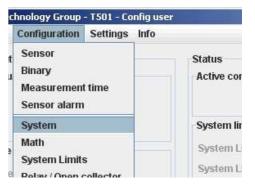
The Machine factor may also be set by means of the number of pulses per rev. The 2 parameters have a fixed relationship of factor 60 (Pulses per rev. = Machine factor x 60)

Machine factor:	0.0001 <b>1</b> 999,999
Pulses per revolution:	0.006 <b>60</b> 59,999,940

Once the machine factor has been established all further entries such as speed limits are in machine units e.g. rpm.



ensor alarm	
Static error sensor 1	
Static error sensor 2	
Dynamic error (only if sensor 1 and 2 are used)	



Sensor 1	
Machine factor	1.0
O Pulses per revolution	60,0
Sensor 2	
	Contraction (1)
Machine factor	1.0

### 7.7.6 Dynamic Error

Go to <Configuration>, <System>.

$$Differenz = \left| f_{S1} - f_{S2} \right| \quad \begin{array}{c} f_{S1}: \text{ Sensor 1 frequency} \\ f_{S2}: \text{ Sensor 2 frequency} \end{array}$$

This function is only available used when both sensor inputs are used. This function has influence only on Sensor alaram.

Deviation: 0.0 ... **100.0** ... 999'999

If the speed difference is greater, then Dynamic error is signalled.

Configuration	Settings Info	
Sensor Binary Measuremen Sensor alarm		Status Active cor
System		System lin
Math System Limits Relay / Open collector		System L
		System L
Dynamic error		
Deviation	100.0	]

# 7.7.7 Math function

Go to <Configuration>, <Math>.

Math function is an additional input available for System Limit. The following Math functions may be constructed.

Subtraction of speed values		
		Division of speed values
Dereentage difference		
Percentage difference		
Variance		
		Speed value acceleration
The speed values are fed through e.g. for the Window function.		

Configuration Settings	Info
t Sensor Binary Measurement time Sensor alarm	Status Active col
System	System li
Math	System L
System Limits Relati / Open collector	System L
Math function	
Math function for System Limit	\$1-\$2

#### Percentage difference

$100 \times (n2 - n1)$	
<i>n</i> 1	

#### Variance

$$S_x^2 = \frac{1}{j-1} \sum_{i=1}^{j} (x_i - \bar{x})^2 \qquad j = 100$$

#### Acceleration

$$a = \frac{\Delta v}{\Delta t} = \frac{n_1 - t_{lalt}}{t_{FlankeS1} - t_{FlankeS1alt}}$$
n: Speed

If the variance for S1, S2 or Analog input needs to be calculated, the measurement time must be set to 5ms or higher.

n: Speed

### 7.7.8 System Limit

Go to <Configuration>, <System Limits>.

Every System Limit has the same 5 logic inputs: Sensor 1, Sensor 2, Math function, Binary input 1, Binary input 2. A hysteresis may be applied to the first 3. Each may be inverted or selected to form part of a logical combination or disabled. The logical combination of inputs may be OR or AND.

Sensor alarm may be additionally combined OR with the System Limit result.

Sensor 1: Limit low: Limit high:	0.01 <b>200.0</b> 999,999 0.01 <b>300.0</b> 999'999
Sensor 2 Limit low: Limit high:	0.01 <b>400.0</b> 999,999 0.01 <b>500.0</b> 999,999
Math Function Limit low: Limit high:	-999,999 <b>50.0</b> 999,999 -999,999 <b>100.0</b> 999,999
Inversion: Sensor 1: Sensor 2: Math: Binary input 1: Binary input 2:	Over speed / Under speed Over speed / Under speed Over-run / Under-run active / inactive active / inactive

#### Inclusion in logical combination:

Sensor 1:	On / Off	System Limit 1
Sensor 2:	<b>On</b> / Off	System Limit 2
Math:	On / Off	System Limit 3
Binary input 1:	On / Off	System Limit 4
Binary input 2:	On / Off	System Limit 4

Logical combination: Combined **OR** / AND

#### Hysteresis

Hysteresis may be definined for the first 3 inputs via upper and lower limits. If the lower limit is set higher than the upper limit, the hysteresis is inverted.

#### Inversion

Every input may be inverted.

c	hnology Group	- T501 - Co	onfig user
1000	Configuration	Settings	Info
ıt	Sensor Binary Measuremen Sensor alarm		Status Active
	System Math		Syster
e	System Limits	s	
e	Relay / Open o Analog output		Syster Syster
u	Copy from Co	ntrol A	Syster

System Limit 1	System Limit 2 Syst	em Limit 3 S	ystem Limit 4 System Limit 5	System	Limit 6	Control
Sensor 1	Limit high	300.0	Overspeed	< >>>	Logic	Control I Control I
0411001	Limit low	200.0	Underspeed		OR	Control
Jensor 2	Limit high	500.0	Overspeed	>>>	O AND	
sensor 2	Limit low	400.0	O Underspeed	222		
Math function	Limit high	100.0	Over-run	>>>		
wath function	Limit low	50.0	O Under-run	333		
Binary input 1			active	>>>		
senary input i			inactive			
Sinary input 2			ective	>>>		
senary input 2			Inactive			
Sensor alarm					OR	
ensor alarm			Main		OR	

Limit high	
Limit low	1



#### Logical combination

The box must be ticked to include the input in the logical combination.

To OR Sensor alarm with the System Limit result the box must be ticked.

### 7.7.9 Relay outputs

To configure relay outputs go to <Configuration>, <Relay / Open Collector>.

Relay configuration consists of: Assignment, the Latch Function and the Fail safe/Not fail safe mode.

> System limit 1 System limit 2 System limit 3 System limit 4 System limit 5 System limit 6

Sensor Error Static S1 Static S2 Dynamic error Always ON Always OFF

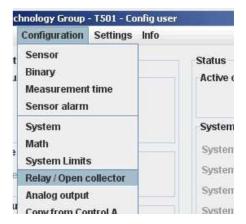
Possible relay assignment:

Latch Function: Safety function:

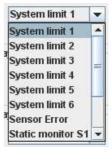
Latched / **not latched Fail safe** / Not fail safe



V >>>



Relay 1		
System limit 1 💌	Catched	Fail safe
	Not latched	🔘 Not fail safe
Relay 2		
System limit 2 💌	Latched	Fail safe
	Not latched	🔾 Not fail safe
Relay 3		
System limit 3 💌	Catched	Fail safe
	Not latched	🔾 Not fail safe
Relay 4		
System limit 4 💌	Catched	Fail safe
	Not latched	Not fail safe



Latched

Not latched

Fail safe

🔘 Not fail safe

#### Assignment selection

The selection box is used to choose relay assignment.

#### Latch Function

Defines whether a relay state should be held until reset.

#### **Safety Function**

Defines whether the relay is to operate in Fail safe (deactivate at e.g. limit) or not fail safe mode (activate at e.g. limit).

To configure Open Collector outputs go to <Configuration>, <Relay / Open Collector>.

Open Collector configuration consists of: Assignment, the Latch Function and the Fail safe/Not fail safe mode.

Possible Open Collector assignment:

- System Limit 1 System Limit 2 System Limit 3 System Limit 4 System Limit 5 System Limit 6 Sensor Error Static S1
- Static S2 Dynamic error Always ON Always OFF **Frequency S1 Frequency S2** Frequency x2 Frequency x4

Latched / not latched

Fail safe / Not fail safe

Latch Function: Safety mode:

# Assignmment selection

The selection box is used to choose Open Collector assignment.

Latch Function

Defines whether an Open Collector state should be held until reset.

#### Safety Function

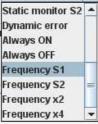
Defines whether the Open Collector is to operate in Fail safe (deactivate at e.g. limit) or not fail safe mode (activate at e.g. limit).

	Configuration	Settings Info	
t	Sensor Binary Measuremen Sensor alarm		Status Active of
	System Math System Limits	s	System System
e	Relay / Open of	collector	System
u	Analog output	Same	System System
Op	en collector 1		

O Latched

⊖ Fail safe





Dpen collector 2 Frequency S2

$\bigcirc$	Latched
۲	Not latched

Fail safe	
🔾 Not fail safe	

#### 7.7.11 Analog output

To configure Analog outputs go to <Configuration>, <Analog out>.

4 parameters are available: Assignment, Current range, Start and End values and the time constant

Assignment possibilities:

Sensor 1 Sensor 2 Math value Analog output 1 Analog output 2

Current range: Start value: End value: Time constant 0 ..20mA / **4 .. 20mA** -999,999 ... **0.0** ... +999,999 -999,999 ... **2'000.0** ... +999'999 **0** ... 9.9 in 0.1 Second increments

Configuration Settings Info	6
Sensor Binary Measurement time Sensor alarm	Status Active o
System	System
Math	System
System Limits Relay / Open collector	System
Analog output	System
Copy from Control A	System
Delay	System

Analog output 1				
Sensor 1 🔻	🔾 020mA output	Start value	0.0	Time constant 0.0 s
	420mA output	End value	2000.0	
Analog output 2				
Sensor 2 🔻	O20mA output	Start value	0.0	Time constant 0.0 s
Looneer a 12	420mA output	End value	2000.0	

### Assignment selection

The selection box is used to choose Analog Output assignment.

#### **Current range**

 $0 \dots 20mA$  or  $4 \dots 20mA$ Error status for  $0 \dots 20mA > 21mA$ . Error status for  $4 \dots 20mA > 2mA$ .

#### Start and End values

Enter the start and end values e.g. 0 (rpm) = 4mA 2000 (rpm) = 20mA

If the end value is lower than the start value the output current follows a falling characteristic.

#### Time constant

Sets a time constant T. The target value is reached after 5xT. The output current follows an e- Function.



0	020mA output
۲	420mA output

Start value	0.0	
End value	2000.0	

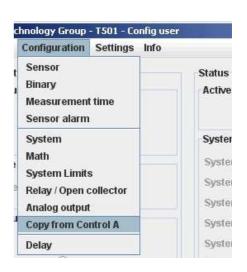
Time constant	0.0	s

#### 7.7.12 Copy Parameter Set

Go to <Configuration>, <Copy from Control A>.

A Parameter set may only be copied from Parameter set A! The following Parameters will be copied:

- Machine factor 1 and 2
- Difference
- Math Function selection
- Upper and Lower Limits in System Limits
- System Limit inversion
- Inclusion of input in the logical combination
- Inclusion of Sensor alarm in the logical combination
- Relay / Open Collector assignment
- Relay / Open Collector latch mode
- Relay / Open Collector fail safe mode
- Analog output assignment
- 0..20mA or 4..20mA setting
- Start and End values
- Analog output time constant



Copy Control parameters

Copy all parameters from Control A to Control B

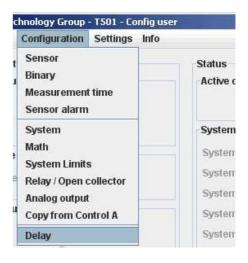
## 7.7.13 Change-over delay

Go to <Configuration>, <Delay>.

One change-over delay may be set for the delay in switching from Parameter set B to Parameter set A only.

Delay time: 0 ... 2000 Seconds

Only integer values can be used for the change-over delay.



Switching of Control A/B
Delay time when switching from Control B->A
0.0 s

### 7.8 Settings

#### 7.8.1 Ethernet Interface

Go to <Settings>, <Interface ...>.

No settings can be made. The PC-T501 connection is Peer to Peer (PC to PC). T501's cannot be connected to a network!

For technical data see Paragraph 3.5.1 Ethernet.

DHCP Server	ON / OFF
TCP/IP Adresse	192.168.1.127
TCP/IP Maske	255.255.255.0

Settings	Info	
Refresh	interval	•
Interface	e	
Change	Config user passwo	ord
Change	Process user pass	word
Display		
Back to	factory setup	

DHCP	✓ ON						
тсрлр							
	Irace		160		N.		
ТСРЛР TCPЛP Add	iress	].	168	].	1	].	

#### 7.8.2 Changing the Password

Go to <Settings>, <Change Config user password> or <Change Process user password>.

Changing the password involves entering the old password and the new password twice. To save the password click on <OK>. The password is now stored in the configuration software. **To change it in the T501 the data must be downloaded**.

A Configuration user may change the Process user password by entering the Configuration user password first. Factory set passwords:

Config User:	1981
Process User	1977

**Attention:** If the password has been changed, there is no way of returning to a factory setup. If someone has forgotten the password, you have to send in the tachometer and we will set it back.

Settings	Info	
Refresh Interface		ł
	Config user password	
Change	Process user password	-
Display		
Back to	factory setup	
Languag	le	•

Change Config user Password

Old Password	
New Password	
Confirm Password	

### 7.9 Info

To gain information about the Tachometer or to enter a Proces name <Info>, <Info about>.

An individual Process name may be entered into the text field to the right of <Prozess ID>, max. 16 characters. (Only alphanumeric characters).

Туре:	Tachometer type number
Java version:	Java Version stored in the Tachometer
Firmware:	T501 Firmware Version
Serial Nr:	T501's serial nr.
Cal. Date:	Calibration date
TCP/IP Address	T501's IP Address

TCP/IP Address: T501's IP Address JRE Version: PC's JAVA Runtime

fig user	and the second se
Info	
About	Status
About	Status

Process ID	
Туре	T501.10
Java version	1.070724
Firmware version	0.50
Serial nummber	T0732200241
Calibration date	100807
TCP/IP Address	192.168.1.127
JRE version	1.6.0_02

## 8 Operating behaviour

### 8.1 Power on

The parameter set e.g. as defined by binary inputs is immediately valid.

#### 8.1.1 Analog Output

Immediately after power on the output corresponds to the lower range value set. Following the first measurement interval the output corresponds to the measured value.

### 8.1.2 Relay Output

Up until the first measurement interval is completed, all relays are de-energised. Thereafter they assume the defined condition.

If no input frequency is present then after measurement interval x 2, 0Hz is assumed.

#### 8.1.3 Open Collector Output

Up until the first measurement interval is completed, all Open Collectors are inactive. Thereafter they assume the defined condition.

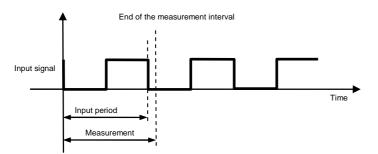
If the Open Collector is assigned to a frequency, then it immediately assumes the corresponding status.

If no input frequency is present then after measurement interval x 2, 0Hz is assumed.

### 8.2 Frequency Measurement

Every frequency measurement starts with the negative edge of the input signal. The last measured edge prior the end of the measurement interval completes the running measurement and immediately starts the next.

An optimum measurement is achieved when the input period is shorter than the measurement interval.

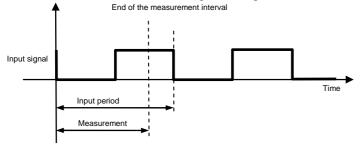


If the input period is greater than the measurement interval, the frequency is calculated as follows:

$$f = \frac{1}{t_{\text{Measurement}} \times n}$$

n: Number of measurement intervals without input signal

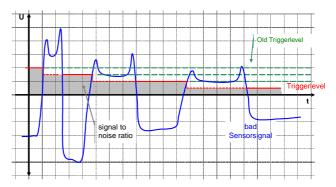
This continues until a second negative edge arrives.



The calculation and adjustment of outputs occurs immediately after the start of the next measurement interval. If the input frequency is lower than the lower limit (0.025Hz), then the output will be zero. The measurement of input frequencies above the upper limit (50kHz) is not guaranteed.

#### 8.2.1 The Adaptive Trigger Level

The trigger level is continuously adjusted for successive pulses. This guarantees that the trigger level can follow a 50% reduction in speed from pulse to pulse. DC offset, resonance and negative pulses have no effect on the triggering



### 8.2.2 Signal failure

Signal failure is defined as the sudden transition from an input frequency to no further recognisable pulses. The frequency is then calculated as follows:

 $f = \frac{1}{t_{\text{Measurement}} \times n}$  n: the number of measurement intervals without an input signal

The measured speed thereby follows an exponential function to the minimum frequency (0.025Hz) and then falls to zero.

### 8.3 Functions

#### 8.3.1 "Exec" Push button

The front panel "Exec" button is ORed with binary input B1. Pushing the button executes the B1 function.

#### 8.3.2 Parameter sets A, B, C and D

The binary inputs must be used to change parameter sets. To configure binary inputs see paragraph 0 Binary input configur.

Binary input configuration	Status BIN 1	Status BIN 2	Selected Parameter set
Binary input 1 to <selection a="" b="" control="" of=""></selection>	0	Х	А
Binary input 2 not to parameter set selection	1	Х	В
Binary input 1 <b>not</b> to parameter set selection	Х	0	С
Binary input 2 to <selection c="" control="" d="" of=""></selection>	Х	1	D
	0	0	A
Binary input 1 to <parameter a="" b="" selection="" set=""> and</parameter>	0	1	В
Binary input 2 to <parameter c="" d="" selection="" set=""></parameter>	1	0	С
	1	1	D

For delay in switching between Parameter sets B and A see Paragraph 7.7.13 Change-over delay.

#### 8.3.3 Limits

User defined upper and lower limits allow wide or narrow hysteresis to be set. Unless otherwise required we recommend a hysteresis of 10%.

#### 8.3.4 Window Function

The Window function as implemented in earlier tachometers is realized in the T501 by means of the Math function.

To set a Window function on a speed input please follow the steps below. (Example for Sensor 1):

1. Set the Math function to S1.

Math function		Control A
		Control B
Math function for System Limit	S1	Control C
		Control D

- Set Math function and Sensor 1 hysteresis.
   The Sensor hysteresis gets the higher limit.
   Math function must be set to under run.
   All logic inputs must be switched off except Sensor 1 and Math function.
- 6. The two inputs must be combined OR.

#### System limit settings

System Limit 1	System Limit 2	System Limit 3	System Limit 4	System Limit 5	System	Limit 6	Control A
		300.0			1.5	Logic	Control B
Sensor 1	Limit high	1300.0	Over	speed	>>>		Control C
	Limit low	200.0	🔾 Unde	rspeed	<b>\</b>	• OR	Control D
Sensor 2	Limit high	500.0	Over	speed	2222	O AND	
5611501 2	Limit low	400.0	🔾 Unde		1		
Math function	Limit high	100.0	Over	-run	>>>		
math function	Limit low	50.0	🔾 🔾 Unde		1		
Binary input 1			@ activ	e	>>>		
binary nipar 1			🔾 inact		5		
Binary input 2			activ	e	>>>		
bindi y nipor E			🔾 inact				
Sensor alarm						OR	
Sensor alarm						OR	

#### 8.3.5 Frequency x2 and x4

Prerequisites for the x2 and x4 function are that the input frequencies are synchronised, they exhibit approximately 90 degrees phase shift and a Mark : Space ratio of approximately 1:1.

The x2 function is an EXOR combination of input frequencies S1 and S2. The x2 output frequency can reach a max value of 35kHz.

The x4 function is based on doubling of the x2 frequency and generates a 10us output pulse each time a positive or negative x2 edge is detected.

The Mark : Space ratio thereby changes with frequency. The x4 output frequency can reach a max value of 35kHz.

Frequency S1	90°						
Frequency S2							
Frequency x2							
Frequency x4	1 <u>0us</u>						

#### 8.3.6 Relay and Open Collector Latch Function

Relays and Open Collectors can be assigned a latch function. If a signal arrives from the assigned function the relay / OC is latched and remains latched until reset via binary input or the <Exec> button.

Where fail safe mode is selected the deactivated Relay / Open Collector state is held.

#### 8.3.7 Analog Output

If an analog time constant higher than zero is set, with measurement interval of 2ms, then the max. frequency that can be measured is 35kHz.

To measure frequencies higher than 35kHz with time constant higher than zero, a min. measurement interval of 5ms must be selected.

Analog output 1					
Sensor 1 🔻	<ul> <li>020mA output</li> <li>420mA output</li> </ul>	Start value End value	0.0	Time constant 0.0	<b>_</b> \$
Analog output 2			(		
Sensor 2 💌	<ul> <li>020mA output</li> <li>420mA output</li> </ul>	Start value End value	0.0	Time constant 0.0	<u> </u>
Measurer	nent time		_		-
Minimal n	neasurement	time of d	evice	2ms	-

If Sensor Alarm is active that influences the analog output, which assumes the error condition:

Configuration	Output current
0 20mA	21mA
4 20mA	4mA

#### 8.3.8 Interpretation of system limit inputs

Upper and lower set points may be set for each of the 3 system limit inputs. In this way a hysteresis is defined. If the upper set point is exceeded then this input assumes a status of 1. When the lower set point is then passed, the status returns to 0. If the actual value lies between the 2 set points then the status is as before.

If a parameters set change takes place when the actual value lies between the set points, then the status also remains as before.

#### 8.4 Fault behaviour

#### 8.4.1 Sensor error

The sensors may be monitored in 3 ways.

- Sensor powered by the T501 Sensor supply current monitoring.
   If the current falls outside of the defined range then static error is signalled.
- Sensor not powered by the T501 wire break detection.
   Static error is signalled when wire breakage occurs. (Impedance measurement of 2 wire sensor)
- 2 speed sensors connected Dynamic sensor monitoring, i.e. the 2 signals may be compared. If the values differ by more than the defined tolerance, dynamic error is signalled.

The T501 behaviour in the event of a sensor fault is a function of the software configuration. If sensor monitoring is selected, a fault causes the LED to go off and the analog output (both) go to error status. The Relay and open collector behaviour is a function of the configuration.

#### 8.4.2 System alarm

The microprocessor continuously monitors the following functions for errors: Supply, math functions of the micro controller, RAM, EEPROM.

In the event of a fault the relays are de-activated, the current output goes to 2mA (4-20mA) or 21mA respectively and the Open Collectors become high resistance if assigned to a function other than frequency output. The T501 then initializes and attempts to run again.

#### 8.5 Power failure

If the power fails for longer than the bridging time the outputs are de-activated, i.e. Analog outputs go to 0mA, relays de-activate and the Open Collectors go to high resistance.

As soon as the supply returns to the minimum required the T501 recommences its initialization routine.

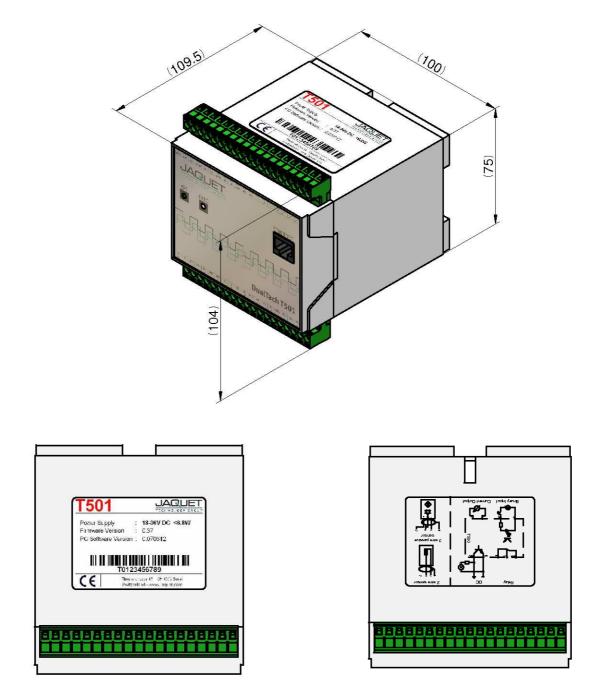
#### 8.6 Behaviour during Configuration

During the transmission of configuration or process parameters to the tachometer, it goes into a safe mode, i.e. the outputs assume a defined state. For individual outputs that means:

- Relays: are no longer powered
- Open Collectors: become high resistance
- Analog outputs: assume the fault mode according to the configuration

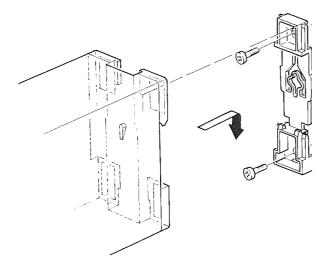
## **9** Mechanical Construction / Housing

#### 9.1 Tachometer



### 9.2 Mounting

#### Wall mounting



Top hat rail mounting (as delivered)

## **10 Accessories**

- Interface cable PC-T501, crossed, 2m:	Part No.	830A-37649
- Interface cable PC-T501, crossed, 5m:	Part No.	830A-37650

## **11 Maintenance / Repair**

T501 tachometers do not require maintenance since they exhibit minimal drift and do not use batteries or other consummables.

If the instrument is to be cleaned please note the protection class!

It is preferable to remove all forms of power (including relay contact supply) during cleaning. Surface cleaning may be carried out using spirit, pure alcohol or soap only.

### **12 Software-Version**

History and changes of the configuration software and firmware

#### 12.1 Configurations software

Software version	Changes
1.070906	First edit
1.080428	Parameter structure expanded

#### 12.2 Firmware

Firmware version	Changes
0.50	First edit
0.89	Parameter structure expanded

## 13 Warranty

The standard warranty in the event of a manufacturing defect confirmed by JAQUET consists of repair or replacement within 12 months of delivery. Ancillary costs are excluded, as is damage caused by use outside the specification. Complaints concerning visible defects will only be accepted if advised to JAQUET within 14 days of receipt.

## Appendix

#### A: Declaration of Conformity

According to the CE guidelines

- 89/336/EEC Electromagnetic Compatibility directive, as amended
- 73/23/EEC Low Voltage Equipment directive, amended by 93/68/EEC

The Products Covered by this Declaration Tachometer Dualtach T501 and Tachometer Multitasker T601

The Manufacturer of the Products covered by this Declaration is



Company: JAQUET AG, Thannerstrasse 15, CH - 4009 Basel Schweiz

The Basis on which Conformity is being Declared

The manufacturer hereby declares under his sole responsibility that the products identified above comply with the protection requirements of the EMC directive and with the principal elements of the safety objectives of the Low Voltage Equipment directive, and that the following standards have been applied: The following harmonised standards are applicable:

- EN 61000-6-4: Generic standarts Emission standart for industrial environments
- EN 61000-6-2: Generic standarts Immunity for industrial environments
- EN 61000-4-2: Electrostatic discharge ommunity test
- EN 61000-4-3: Radiated, radio-frequency, electromagnetic field immunity test
- EN 61000-4-4: Electrical fast transient/burst immunity test
- EN 61000-4-5: Surge immunity test
- EN 61000-4-6: Immunity to conducted disturbances, induced by radio-frequency fields
- EN 61000-4-8: Power frequency magnetic field immunity test
- EN 61000-4-11: Voltage dips, short interruptions and voltage variations immunity test

The following national standards are applicable:

- IEC 60068-2-1/2/30/6
- IEC 61131-2

The technical documentation required to demonstrate that the products meet the requirements of the Low Voltage Equipment directive has been compiled and is available for inspection by the relevant enforcement authorities. The CE mark was first applied in:

Signed:

Authority:

сто

Head Quality Management

Date: Basel, the 07.11.07

### **B: Possible Problems**

#### Neither green nor yellow LAN connector LED light up

Cause:	No physical (electrical) connection present.
Solution:	Check that a LAN Crossover cable is being used.
Cause:	Tachometer is unpowered.
Solution:	Check the supply connections and level.
Cause:	<ul> <li>Computer network card is switched off or de-activated (energy save mode)</li> <li>Open the Network Connections window.</li></ul>
Solution:	<start> → <settings> → <control panel=""> → <network connections=""> <li>Click on the appropriate connection</li> <li>Open the Menu <file></file></li> <li>Select <deactivate></deactivate></li> <li>Re-open Menu <file></file></li> <li>Select - Activate</li> </network></control></settings></start>

Select <Activate>

### Yellow LAN connector LED lights but no connection to browser

Cause:

Several instruments are connected to the same LAN as the tachometer.

Solution: The tachometer only functions with a <Pier to Pier> connection. Remove the other equipment and insure that no hub, switch or router is connected between tachometer and computer.

Cause:

Computer LAN card not set correctly.

Solution: Configure the card in accordance with chapter 7 Configuration via PC Software. If that does not solve the problem check that the network card is configured as follows:

Go to Desktop, Settings, Network connections and right click on <Properties>. Right click on the network card you want to use and select <Properties>.



Select Internet protocol (TCP/IP) and select the options:

→ <IP-Address automatically recognize>

 $\rightarrow$  <DNS-Server address automatically recognize>

Then select <Advanced>.

Insure that:

 $\rightarrow$  apart from the entries shown, no other entries are present.

Select the tag <DNS> and insure that:

 $\rightarrow$  no entries are present.

en Netz eziehen	werkadministrator, um d	ützt. Wenden Sie sich andernfalls an lie geeigneten IP-Einstellungen zu
<u>⊚ IP</u> -4	dresse automatisch bez	ziehen
O Folg	gende IP <u>A</u> dresse verwe	milion.
]P-Adr	esse.	
Sybne	tzmaske:	
Stand	ardgateway:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
DNI	S-Serveradresse automa	and bearing as
	jende DNG Cerveradree	and the second
Bevor	zugter DNS-Server:	
Alterna	ativer DNS-Server.	

eiterte TCP/IP-	Einstellungen
Einstellungen DN	IS WINS Optionen
IP-Adressen	
IP-Adresse	Subnetzmaske
DHCP-aktiviert	
	Hinzufügen Bearbeiten Entfernen
Standardgateways	e
Gateway	Metrik
	Hinzufügen Bearbeiten Entfernen
Automatische M Schnittstellenmetr	

P-Einstellunger DNS	WINS	Optionen		
D <u>N</u> S-Serveradressen in '	Verwendu	ingsreihenfolge:	1	
				t
				2
Hinn	ufügen	Bearbeiten	Entfernen	
<u></u>				
Die folgenden drei Einste				
				die
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TCP/IP aktiviert ist: Für Primäre und verbindu	die Auflös Ingsspezif	ung unvollständi ische DNS-Suffi	ger Namen: ke anhängen	
TCP/IP aktiviert ist: Für Primäre und verbindu Ubergeorghete S	die Auflösi ingsspezif iuffixe des	ung unvollständi ische DNS-Suffi primären DNS-S	ger Namen: ke anhängen	
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Select the tag <WINS> and insure that:

- $\rightarrow$  no entries are present.
- $\rightarrow$  NetBIOS- Setting is Standard.

Confirm with <OK>

Change to tag <Alternative Configuration>.

Insure that:

 $\rightarrow$  <Automatically allocated, private IP-Address> is selected.

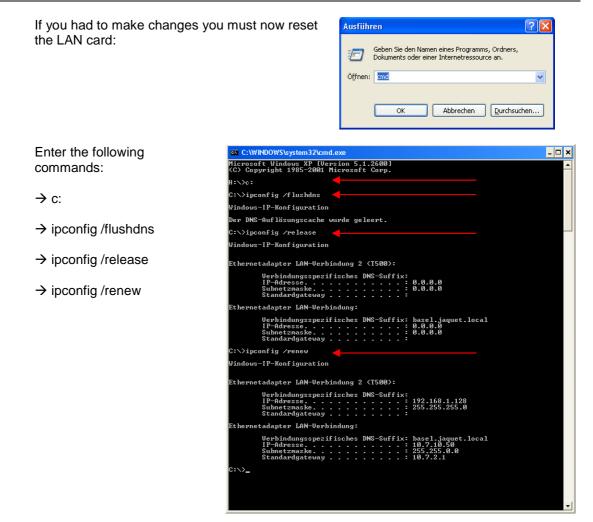
Confirm all settings with <OK>

Confirm settings with <OK>

WINS-Adressen in Verwendungsteihenlolge: Hingufügen Beacheiten Entfemen Wenn die LMHOSTS-Abfrage aktiviert ist, gilt sie für alle Verbindungen, für die TCP/IP aktiviert ist. UMHOSTS-Abfrage aktivieren LMHOSTS importieren NetBIOS-Einstellung Standard NetBIOS-Einstellung MetBIOS-Einstellung MetBIOS-Einstellung NetBIOS-Einstellung MetBIOS-Einstellung NetBIOS-Einstellung NetBIOS-Einstellung NetBIOS-Einstellung NetBIOS-Einstellung NetBIOS-Einstellung NetBIOS-Einstellung NetBIOS-Einstellung NetBIOS-Einstellung NetBIOS-Einstellung Abier TCP/IP aktivieren NetBIOS über TCP/IP deaktivieren	P-Einstellungen DNS	WINS Option	nen
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Benachric	htigen, wenr	n diese Verbindun	g eingeschränkte oder
kaina Kar	nektivität be	sitzt	



#### The tachometer responds with incomprehensible hieroglyphics

Cause:Your browser and computer interpret the address incorrectly.Solution:Extend the address with a forward slash: <a href="http://192.168.1.127/software/">http://192.168.1.127/software/</a>



#### Problems when using Microsoft Internet Explorer

Cause:

Your browser and computer interpret the address incorrectly.

- Solution:
- Close Internet Explorer
- Restart Internet Explorer
- Wait until IE has fully loaded and the computer is inactive.
- Call the tachometer using the address: <u>http://192.168.1.127/software/</u>

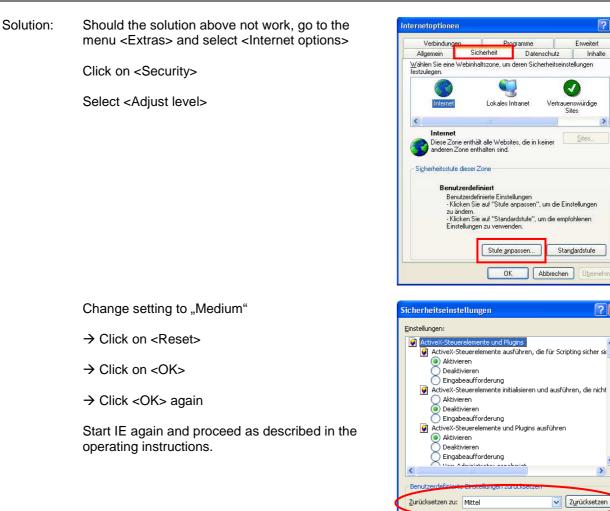
>

?

>

Abbrechen

ОК



#### The first page is shown correctly but after selecting Download nothing happens

Cause: Solution: The IE security level is too restrictive. Set the security level to "Medium".

In the Menu <Extras> select <Internet options>

Change tab to <Security>

Select <Adjust Level>



- → Change settings to "Medium"
- → Click on <Reset>
- $\rightarrow$  Click <OK>
- → Click <OK> again

Start IE again and proceed as described in the operating instructions.

Sicherheitseinstellungen	<u>?</u> ×
Einstellungen:	
ActiveX-Steuerelemente und Plugins     ActiveX-Steuerelemente ausführen, die für Scripting sic     Aktiveren     Deaktivieren     Eingabeaufforderung     Aktivers     Deaktivieren     Deaktivieren     Eingabeaufforderung     ActiveX-Steuerelemente und Plugins ausführen     Deaktivieren     Eingabeaufforderung     Aktiveren     Deaktivieren     Deaktivieren	
Zurücksetzen zu: Mittel	setzen
ОК АЫ	echen

Solution: Should you not be able to change these settings we recommend you try the browser Firefox (freeware).

#### Problems using Internet Browser Mozilla

Cause:

"Ping" works but an error message appears - Proxy Server not found. A Proxy Server is defined.

Solution: Avoid the Proxy- Server.

In the Menu <Extras> select <Settings>

Change the tab to <Network>

Select <Settings>

Einstellunge	an							X
Ť			3	6		<u></u>		
Allgemein	Tabs	Inhalt	Feeds	Datenschutz	Sicherheit	Erweitert		
	etzwerk (	Jpdate Ve	rschlüsselu	ng				
Verbindu Festleger Cache – Es werde	n, wie sich			net verbindet olatz als Cache v	rerwendet		Einstellungen	
					ОК	Abbr	echen <u>H</u> ilfe	

Select < Direct Connection to	
Internet>	

Confirm with <OK>

Direkte Verbindu				
- ·	lungen für dieses Netz <u>w</u> er 	'K automatisch	) erke	nnen
Manuelle Proxy- HTTP-Proxy:		E	ort:	0
	Eür alle Protokolle die	esen Proxyser	ver v	erwenden
<u>S</u> SL-Proxy:		F	ort:	0
FTP-Pro <u>x</u> y:		F	o <u>r</u> t:	0
<u>G</u> opher-Proxy:		F	ort:	0
SO <u>C</u> KS-Host:		F	or <u>t</u> :	0
	○ SOCKS v4 ● SOC	IKS <u>∨</u> 5		
Kein Prox <u>y</u> für:	localhost, 127.0.0.1			
	Beispiel: .mozilla.org, .ne	t.de, 192.168	3.1.0/	24
🔘 Automatische Pr	xy-Konfigurations-URL:			

### How do I see which Java Version is installed on my PC?

Solution Go to <Control Panel> (Win XP) And select <Java> (the coffee cup)

Systemsteuerung Datei Bearbeiten Ansicht Eavoriten Es	drac ?			
2 2 2 2 2	n 🎦 Ordner 🛄 •			-
Adresse 🔂 Systemsteuerung	-		~	> Wechseln zu
Systemsteuerung 🛞	Anzeige	Automatische Updates	Benutzerkonten	ŕ
Zur Kategorieansicht wechseln	Broadcom Control Suite 2	Detum und Uhrzeit	)))) Drahtlosnetzwerkinstallation	
Windows Update     Windows Update     Windows Update     Windows Update	Drucker und Faxgeräte	Eingabehilfen	Energieoptionen	
	Gamecontroller	Geplante Tasks	Hardware Hardware	
	Internetoptionen	\$ m	i Mail	
	Maus	Netzwerkverbindungen	Ordneroptionen	
	Regions- und Sprachoptionen	Scanner und Kameras	Schriftarten	
	Sicherheitscenter	Software	SoundMAX	
	Sounds und Audiogeräte	Sprachein-/ausgabe	System	
	Taskleiste und Startmenü	Sastatur Tastatur	Telefon- und Modemoptionen	
	Verwaltung	Windows-Firewall		

Select < Application Info...>

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Further information on Java-Technologies and Applications can be seen at <a href="http://www.java.com">http://www.java.com</a>