*NAUTIC-*Tachograph
Electronic Tachograph for inland water navigation

USER GUIDE

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INTRODUCTION

The *NAUTIC*-Tachograph is an electronic tachograph, which has been designed especially for watercrafts. The device fulfils all requirements according to §23.05 no. 2 and annex H of the "Rheinschiffsuntersuchungsordnung" (Edition dated 01.07.2002).

The *NAUTIC*-Tachograph is able to record more than 3000 events. In addition the device has a compression function, i.e. events will only be memorized, if they have been active for more than 1 minute. – In regular operation the navigation activities can be recorded over a period of more than 6 months.

To meet regulations, or if otherwise required, specified periods can be printed out at any time. A built-in warning lamp starts to flash as soon as there is a risk of current data being overwritten.

The *NAUTIC*-Tachograph not only fulfils all legal requirements but also offers a whole range of additional options. For example the monitoring of fuel consumption and engine speed. The *NAUTIC*-Tachograph can be upgraded in order to enable the recording of further interesting operational data.

This manual shows you how easy the device can be operated.

OPERATING

Front panel

Normally the display of the *NAUTIC*-**Tachograph** shows the actual time and the selected operation mode.

In addition three information lamps are available:

 If indicator lamp is lighted, the vessel is in speed. This signal allows the function control of the tachograph. At a dysfunction the lamp is flashing.

 If indicator lamp flashes, data memory has reached its capacity limits. To avoid overwriting (=loss of overwritten data), all memorized data should be saved on paper as soon as possible.

 If indicator lamp flashes, storage capacity is exceeded. The oldest data are now being over-written, without having been saved on paper.

MODE: Changing of operation mode
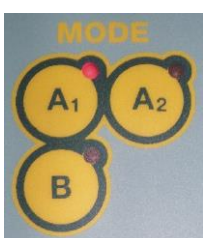
 The lighted lamp indicates the actual operation mode. By pressing one of the op-eration mode keys a different operation mode is being selected.

PRINT: Printing of data

With the three print keys and the paper feed key printing is started and controlled. No data will be deleted by printing.

By pressing this button the tachograph searches for the oldest not saved date. From this on to the actual date, all data will be printed in **protocol form**.

With this key the data of a **selected period** will be printed in **cumulative form**.

With this key the data of a **selected period** will be printed in **protocol form**.

The paper feed key activates two different operations:

1. Printing of data inactive:
   By pressing this button the paper is being fed forward some lines.
2. Printing of data active:
   By pressing this button the printout is being stopped.

Entering a period for printing control

By pressing this key (00.00) appears on the display.
Now a date can be entered. Confirm by pressing <SET> again.

Example 1: Printing data of one day only in protocol form:
Date: 27th August

Key	Display	
<SET>	(00.00)	Start of entering mode
<2> <7> <0> <8>	(27.08)	Enter date
<SET>	(00.00)	Set
<SET>	(time)	Set 00.00, as only one day is to be printed out
<III>	(time)	Data are being printed in protocol form

Example 2: Printing data of several days in cumulative form:
Dates: 27th August to 10th September

Key	Display	
<SET>	(00.00)	Start of entering mode
<2> <7> <0> <8>	(27.08)	Enter start date
<SET>	(00.00)	Set
<1> <0> <0> <9>	(10.09)	Enter finish date
<SET>	(time)	Set
<II>	(time)	Data are being printed in cumulative form

When entering the date you must not wait longer than 4 sec. before pressing the next button. If this time is exceeded the device changes automatically back to the basic function and the entering of the date has to be repeated.

Function codes

The ***NAUTIC*-Tachograph** features so called function codes. With these codes, which are entered via the keypad, various functions of the device can be called up. The function code is a two-digit figure and is selected by the following key sequence:

(FNC) \<X> \<X> (SET)
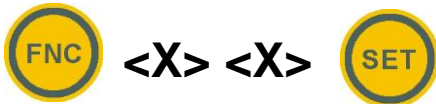
Code	Function	
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* Access to function only possible if all data have been saved on paper. To prevent manipulations, the whole memory will be deleted.

Changing language version (FNC 30)

The device provides printouts in German, Italian and French. With function code 30 you can switch between the language versions.

Access to function   :   <FNC> <3> <0> <SET>
Display   :   (1: X) / "X" stands for the selected language

1 = German
2 = Italian
3 = French

Now the desired language can be selected. With <SET> you leave the function.

Changing recording delay (FNC 31)

To avoid recording of insignificant events, a delay of 1 to 4 minutes can be entered (condense function). Power-up and power-down operations, which are below the selected delay, will be suppressed. – This recording delay complies with the legally prescribed event resolution.

Access to function   :   <FNC> <3> <1> <SET>
Display   :   (1: X) / "X" stands for the actually set delay time of 1, 2, 3 or 4 minutes

Now the desired delay time can be set by entering the according value (1, 2, 3 or 4) in minutes.

With <SET> you leave the function.

Test of keypad and display (FNC 56)

The manufacturer needs this function to check the functioning of the front panel. – In case of malfunction, the user has the possibility to check if the front panel is working correctly.

Access to function   :   <FNC> <5> <6> <SET>

Now every button, when pressed, causes the assigned value to be shown on the display.

By pressing, e.g., button <CLR>, the display shows: 11

Return by multiple pressing of button A1.

Clock functions (FNC 34, 35)

In normal case the basic display shows the time.

By pressing this button, the actual date is displayed for 4 seconds.
The time can be changed with function 34.

Example: actual time: 14:31 h
time to be set: 15:35 h

Access to function: <FNC> <3> <4> <SET>

	Display	*Entry*	*Display*	*Set*
Hour	(H:14)	<1> <5>	(H:15)	<SET>
Minute	(MI:31)	<3> <5>	(MI:35)	<SET>

When setting the minutes, the seconds are automatically set to 0.

With function 35 (FNC35) also the date can be changed. The access to this function is only possible if all data have been saved on paper before. (Save all data with button *<Print I>*).

The complete memory contents will be deleted by using function 35!

Example: actual time/date: Tue, 14th January 1986, 09:33 h
time/date to be set: Mon, 26th March 2007, 13:14 h

Access to function: <FNC> <3> <5> <SET>

	Display	*Entry*	*Display*	*Set*	
Year	(J:86)	<0> <7>	(J:07)	<SET>	
Month	(MO:01)	<0> <3>	(MO:03)	<SET>	
Weekday	(Wd:02)	<0> <1>	(Wd:01)	<SET>	*(01=Mon, 02=Tue, ..., 07=Sun)*
Day	(d:14)	<2> <6>	(d:28)	<SET>	
Hour	(H:09)	<1> <3>	(H:13)	<SET>	
Minute	(MI:33)	<1> <4>	(MI:14)	<SET>	

Entering headlines (FNC 60, 61, 62)

FNC 60   Headline 1
FNC 61   Headline 2
FNC 62   Headline 3

The alphanumeric characters have to be entered in a numerical code in decimal writing (see code table).

Access to this function is only possible, if the complete memory has been saved on paper in advance!

Save all data with button

Example: Entering name of vessel "MS ALPINA"

After entering the key sequence <FNC> <6> <0> <SET> the display shows:

(1:XX) "1"means: First character of the text
         "XX" means: A possibly in advance entered numerical code according to the above mentioned code-table

Sequence:	consecutive numbering	character to be printed	numerical code to be entered
	1	M	50
	2	S	56
	3		05
	4	A	38
	5	L	49
	6	P	53
	7	I	46
	8	N	51
	9	A	38
	10	final character	04

CODE-TABLE for text input in *NAUTIC*-Tachograph

Capital letters	*Minuscule letters*	*Special characters*
A = 38	a = 70	! = 06
B = 39	b = 71	" = 07
C = 40	c = 72	# = 08
D = 41	d = 73	$ = 09
E = 42	e = 74	% = 10
F = 43	f = 75	' = 12
H = 45	h = 77	(= 13
I = 46	i = 78	) = 14
J = 47	j = 79	* = 15
K = 48	k = 80	+ = 16
L = 49	l = 81	, = 17
M = 50	m = 82	- = 18
N = 51	n = 83	. = 19
O = 52	o = 84	/ = 20
P = 53	p = 85	: = 31
Q = 54	q = 86	; = 32
R = 55	r = 87	< = 33
S = 56	s = 88	= = 34
T = 57	t = 89	> = 35
U = 58	u = 90	? = 36
V = 59	v = 91	
W = 60	w = 92	
X = 61	x = 93	Space = 05
Y = 62	y = 94	Final character = 04
Z = 63	z = 95	
Ä = 64	ä = 96	
Ö = 65	ö = 97	
Ü = 66	ü = 98	

Figures
0 = 21
1 = 22
2 = 23
3 = 24
4 = 25
5 = 26
6 = 27
7 = 28
8 = 29
9 = 30

Machine data

The *NAUTIC*-**Tachograph** can record revolutions and fuel consumption of 2 machines.

Display current revolution (FNC 70, 71)

FNC 70:   Current revolution shaft 1
FNC 71:   Current revolution shaft 2

The revolution values, which are necessary to set the speed/stop state, can be shown on the display.

Example: Display current revolution of shaft 1

Access to function: <FNC> <7> <0> <SET>

On the display appears the current revolution of shaft 1 in number of revolutions per minute. Periodically also the information "U 1" appears on the display. With "U 1" the display function (revolutions) and the corresponding shaft (1) are identified.

Any button can be pressed to leave this function.

Revolution counter (FNC 73, 74)

FNC 73:   absolute revolutions shaft 1
FNC 74:   absolute revolutions shaft 2

The revolution counter records the absolute revolutions of the propeller shafts. This value shows the load on the individual machines.

Example: Display absolute revolutions of shaft 2 since last reset

Access to function: <FNC> <7> <4> <SET>

The number of revolutions since the last reset will now be displayed in number of millions for a period of 4 seconds. Subsequently the actual time will be displayed again.

Reset of revolution counters (FNC 79)

With function code 79 the revolution counters are set to zero.

Access to function: <FNC> <7> <9> <SET>

Option "Printing revolution progression" (FNC 77)

The option "revolution progression" allows to draw conclusions regarding the performance of the vessel.

The *NAUTIC*-**Tachograph** checks the revolutions of the propeller shaft in 1 sec intervals. After 60 minutes or after every stop, the minimum, maximum and the average values of shaft 1 are being memorized. Of shaft 2 only the average value is memorized.

Printout of collected data: <FNC> <7> <7> <SET>

Before selecting this function, a period for the desired printout can be entered as described on page 5.

With button the printing can be interrupted at any time.

Display current fuel consumption (FNC 80, 81)

FNC 80:   Current fuel consumption motor 1
FNC 81:   Current fuel consumption motor 2

The fuel consumption is displayed in number of litres per hour.

Example: Display current fuel consumption of motor 1

Access to function: <FNC> <8> <0> <SET>

On the display appears the current consumption in litres per hour. Periodically also the information "d 1" is shown on the display. This information identifies the display as current consumption motor 1.

Any button can be pressed to leave this function.

Display absolute fuel consumption (FNC 83, 84)

FNC 83:   absolute fuel consumption motor 1
FNC 84:   absolute fuel consumption motor 2

Example: Display absolute fuel consumption of motor 2 since last reset.

Access to function: <FNC> <8> <4> <SET>

The amount of consumed fuel of motor 2 in number of thousand litres is now displayed for 4 seconds. Subsequently the actual time is displayed again.

Reset of consumption counters (FNC 89)

The consumption counters can be set to zero with function code 89.

Access to function: <FNC> <8> <9> <SET>

Entering fuel constant (FNC 86)

With function code 86 the fuel constant can be entered in number of impulses per litre.

Access to function: <FNC> <8> <6> <SET>

The fuel constant describes the number of fuel impulses, received by the **NAUTIC-Tachograph** over a quantity of 1 litre. This constant can only be set manually.

The fuel constant is a 4 digit number. All 4 digits including leading zeros have to be entered.

Precondition:	minimum allowed constant:	0100 (= 100 impulses/litre)
	maximum allowed constant:	9999 (= 9999 impulses/litre)

Example: Fuel constant to be entered: 962 impulses/litre

By entering this function the display shows:

       (1: X)   " X " stands for the character which was set at the last entry.

Sequence:	*Display*	*Entry*	*Display*	*Set*
	(1: X)	<0>	(1: 0)	<SET>
	(2: X)	<9>	(2: 9)	<SET>
	(3: X)	<6>	(3: 6)	<SET>
	(4: X)	<2>	(4: 2)	<SET>
	time			

Faulty insertions can be corrected by retyping before pressing button <SET>.

Printing machine data (FNC 90)

Machine data can be printed on paper. At the same time also the date of the last reset will be indicated.

Access to function: <FNC> <9> <0> <SET>

Replacement of printing paper

Recommended thermal paper:
Width: 58 mm (+0/-1 mm)
Diameter: max 32 mm
Length: approx. 8 m

To replace printing paper proceed as follows:

1. Open lid of printer by lifting the transparent lever
2. Remove empty paper roll from the paper compartment

3. Insert new paper roll and pull out paper slightly

4. Close printer lid carefully by evenly pressing it on.

Storage of printouts

Under correct storage conditions the printouts on thermal paper can be kept for approx. 5 years.
Dependent on the quality of the used paper a storage period of up to 10 years is possible.

Recommended storage conditions:
Cool and dry: temperature 20°C ±5°C / humidity 54% ±10%
Dark: no UV irradiance by the sun, etc.
No contact with chemical or plastic materials.

ERROR MESSAGES

Message	Meaning	Debugging/Conduct
F 64	Data circuit to printer is interrupted, no answer from printer. Printer is automatically switched off, afterwards printing is possible again.	Print again
F 65	The printer is OFF-Line and does not receive any data. Printer is automatically switched off, afterwards printing is possible again.	Print again
F 66	Printer has no paper	Exchange paper roll, print again
F 67	Printer-Time-Out XON/XOFF-protocol. Printer is automatically switched off, afterwards printing is possible again.	Print again
F 70	Clock incorrectly set -> direct access to function "Set clock"	Set clock anew
F 71	HW-error clock (read error)	----
F 72	HW-error clock (clock standstill)	----
F 73	Voltage interruption to clock -> direct access to "Set clock"	Set clock anew
F 90	System message (TRAP)	----
F 91	System message (NMI)	----
F 92	System message (SWI)	----
F 93	System message (IRQ1)	----
F 94	System message (Watch dog)	----
F 95	System message (ROM1)	----
F 97	System message (RAM1)	----

OPTION „AUXILIARY UNITS"

Operating

With the option "auxiliary units" the *NAUTIC*-**Tachograph** can record four groups of auxiliary units. The protocol data of each group can be individually recalled.

Display operation modes (FNC 95)

The active operation modes (on/off) of the auxiliary units can be shown on the display at any time with function code 95.

Access to function: <FNC> <9> <5> <SET>

The display shows: (X.X.X.X)   X = 1:   unit on
                                        X = 0:   unit off

The displayed value has to be read from left to right, i.e. the leftmost figure is assigned to group 1 and the rightmost figure to group 4.

Printing of protocol (FNC 91 – 94)

Function	*Printout*
FNC 91	group 1
FNC 92	group 2
FNC 93	group 3
FNC 94	group 4

The entry of a period for the printing control has to be executed as described on page 5 of this manual. The selected period changes only at the next entry, i.e. several protocols can be printed out consecutively with a one-time selected period.

Example: Printing protocol of group 2

Entry: <FNC> <9> <2> <SET>

With button the printing can be interrupted.

Remark regarding printed protocol data:
If the display shows a star (*) prior to the operation period this means that the period is possibly incorrect due to a power blackout, a dysfunction of the sensors or a modification of the clock. The exact cause for this can be found on the printouts of the navigation activity data protocol.