

Visual Marking Controller HK

Standard tool for host coupling

Software Description

Version 4.7



THE MARK OF EXCELLENCE

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1 The function of the VMC_HK tool

The host coupling of the VisualMarking controller is a program for executing VLM drawings. It is remote-controllable via various interfaces and thereby it is perfectly suited to the automate producing firm.

1.1 Installation

The installation of the VisualMarkingController host coupling requires the installation of the VisualLaserMarker. The install programs of the VMC-HC and of the VisualLaserMarker are supplied on a CD.

The VMC_HK's installation directory cannot be selected, it is used automatically the installation directory of the VisualLaserMarker.

1.2 Manual mode

In the manual mode VLM files can be selected, loaded and executed manually. The manual mode is set in the option dialog (» *section 'The Options dialog'*).

1.3 Host coupling mode

If a host coupling is selected, VMC_HK is continuously ready to receive. If telegrams are sent, they will be evaluated and then be processed in accordance to that.

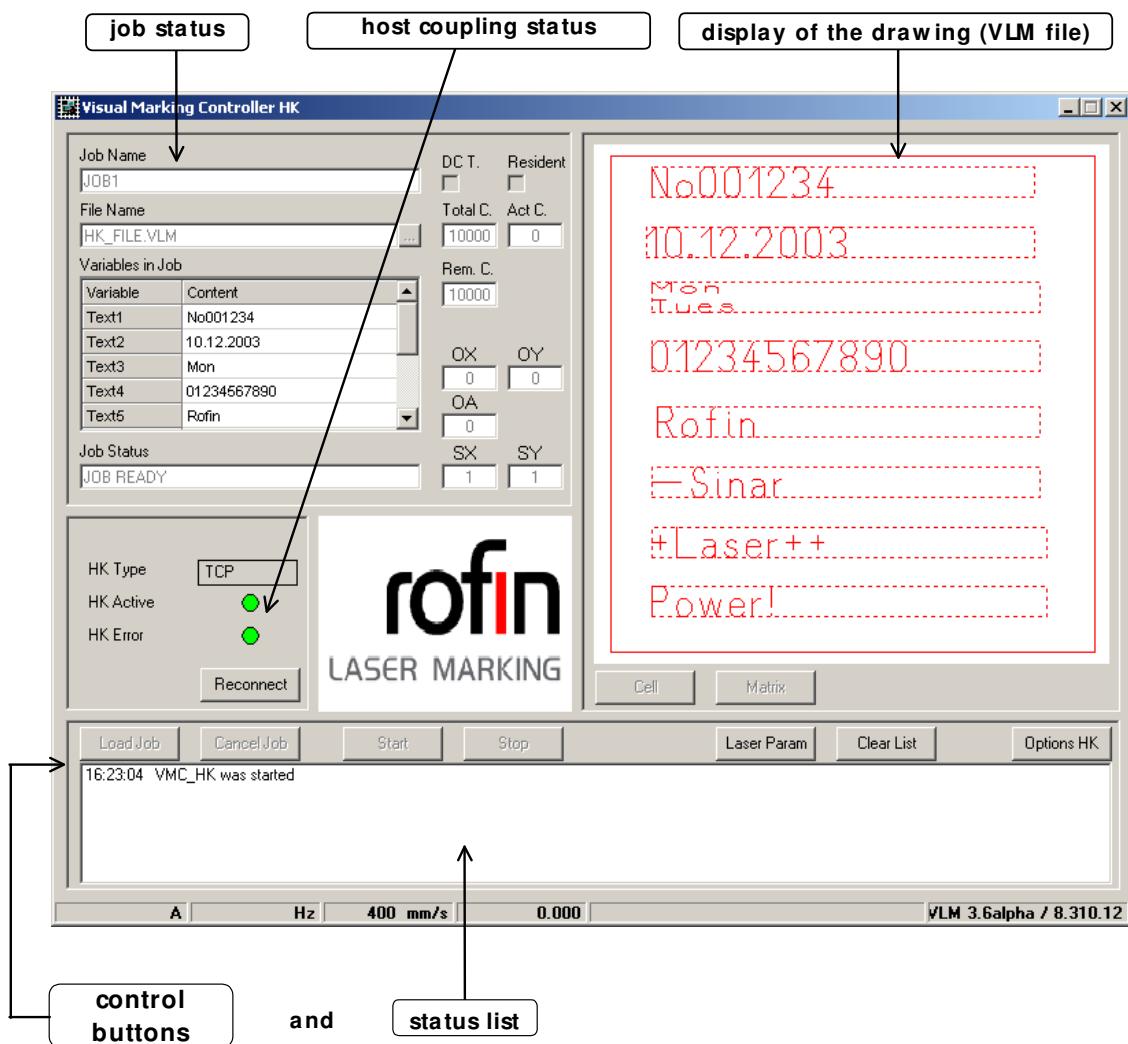
1.4 File location – path settings

The path for storing files which are loaded in the HK mode is set in the VisualLaserMarker on the **Path settings** screen of the **Options** menu under **Editor settings...**

1.5 The main window of the VMC_HK

The user interface of the VMC_HK main window has the identical structure in the host coupling mode and in the manual mode. It is composed of the following four sections:

- ⇒ Job status
- ⇒ Host coupling status
- ⇒ Display of the drawing (VLM file)
- ⇒ Control buttons and status list



Section job status

In the manual mode in the **Job status** section a VLM file can be loaded manually which is displayed immediately after selection in the **Display of the drawing** section of the drawing. The selection does not activate the execution of the drawing. After loading the file by pressing the **[Load Job]** button the drawing can be executed by pressing the **[Start]** button.

- 3 This section is activated in the manual mode.

Section host coupling status

In this section the type of the selected host coupling is shown:

RS232	Serial connection without special protocol
DK3964R	Serial connection with DK3964R protocol
TCP	TCP/IP network connection
Manual	No host is connected

If an error occurs during initialization of the host coupling drivers or the manual HK mode is selected, the red HK active LED lights up. If the interface of the host coupling is correct, the green HK active LED lights up. The green LED indicates the correct operation of the interface on the part of the PC of the laser marker which does not indicate that there is a correct connection to the host. The correct connection to the host can only be controlled by means of a correct data transmission.

If during operation in the HK mode (not valid in the manual mode) an error occurs, a red HK error LED lights up. If the host coupling is correct, the green HK error LED lights up.

When the connection is not active an existing connection can be initialized by pressing the **[Reconnect]** button after having eliminated possible connecting errors (defective serial cable).

Section display of the drawing (VLM file)

The VLM file which has been selected manually or by means of the host is displayed in this section. The variables that are contained in the telegram are shown in this drawing.

Section control buttons and status list

Using the buttons of this section loading or cancelling VLM files and starting or stopping the execution of the VLM marking is possible in the manual mode. The current state of the execution is displayed in the status list.

The **[LoadJob]**, **[CancelJob]** and **[StartJob]** buttons are not selectable in the HK mode. These buttons are intended for the manual mode only.

[Load Job]	Loading a job/VLM drawing
[Cancel Job]	Cancelling a job/VLM drawing
[Start]	Starting the laser marking
[Stop]	Immediate stop of the laser marking
[Laser Param]	Manual settings of the global laser parameters
[Clear List]	Deletion of the status list
[Options HK]	Viewing the dialog page HK Options

2 The Options dialog – HK Options

In the HK Options dialog it is possible to configurate the HK type and the transmission parameters. The DC telegram is also defined in the HK Options dialog.

If in the UserManager the section HK_OPT is activated, the user and the password are requested when pressing the [Options HK] button, to determine if authorization to change the settings was granted.

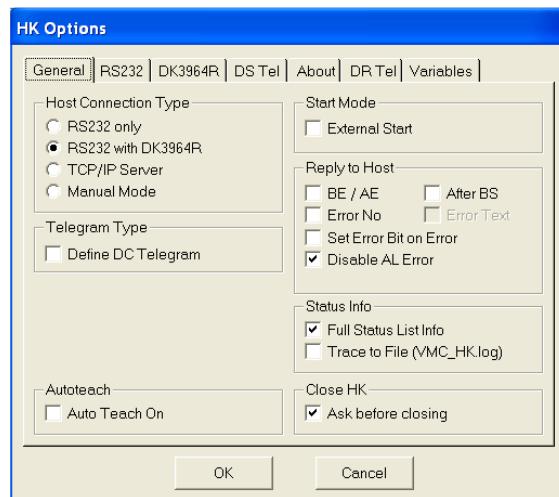
» *Section 'The User Manager connection'.*



2.1 General - General settings

The following dialog field page is shown by clicking the [Options HK] button in the main window:

- 3 Depending on the selected options associated screens may or may not be displayed.



Host Connection Type

In the Host Connection Type section the following HK types can be set:

RS232 only:	Mode for host coupling via serial port.
RS232 with DK3964R:	Mode for host coupling via serial port with the Siemens protocol DK 3964R.
TCP/IP Server:	Mode for host coupling via network with TCP/IP protocol.
Manual Mode:	Manual mode for selecting, loading and executing VLM drawings manually.

Telegram Type

Define DC Telegram	When activating Define DC Telegram <input checked="" type="checkbox"/> the DC Vars screen is shown and the DC telegram can be defined.
---------------------------	--

Start Mode

External start	In the Start Mode section you can determine if starting is permitted via the external start (External Start <input checked="" type="checkbox"/>). The external start signal is set to the X50 connector on pin three.
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Reply to Host

BE / AE	The Reply to Host section offers the possibility to send a BE Telegram to the host after the successful execution of the marking.
After BS	When After BS (<input checked="" type="checkbox"/>) is activated the BE Telegram is sent to the host only if a BS Telegram has been sent before but not after an external start.
Error Number	If Error Number is deactivated (<input type="checkbox"/>) the QN Telegram will be reported to the host when an error occurs; e.g.: QN. If Error Number is activated (<input checked="" type="checkbox"/>) the QN Telegram will be provided with a number and reported to the host when an error occurs; e.g.: QN1001.
Error Text	If Error Number and Error Text are activated (<input checked="" type="checkbox"/>) the QN Telegram will be provided with a number and will be reported with a corresponding text to the host when an error occurs; e.g.: QN1002 The telegram from host is unknown. The error number consists of four digits.
Set Error Bit on Error	If Set Error Bit on Error is activated (<input checked="" type="checkbox"/>) the error bit is set on the PCLD or ALI board in case of errors. Bit 4 at port 1A is the error bit.
Disable AL Error	If an AL Telegram is sent from the host to the VMC_HK , after an AU telegram has been sent or a job has been finished automatically after the job counter run zero, usually a QN is returned to the host. If Disable AL Error is activated (<input checked="" type="checkbox"/>) a QA is returned in response to an AL Telegram from the VMC_HK to the host.

Status Info

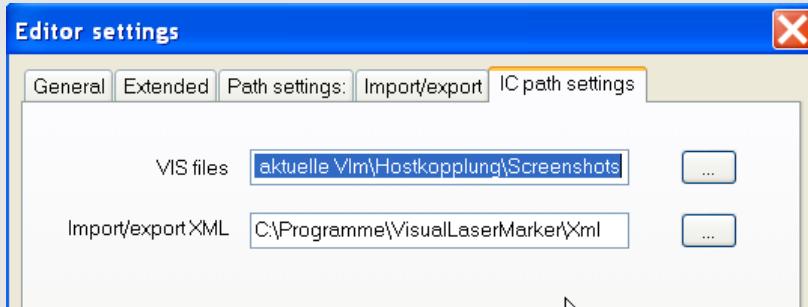
The following settings are possible in the **Status Info** section:

Full Status Info:	If the check box is activated <input checked="" type="checkbox"/> all Status Info messages are shown in the status list and in the VMC_HK.log trace file.
Trace to file (VMC_HK.log):	If activated <input checked="" type="checkbox"/> all messages shown in the status list are logged in the VMC_HK.log file. The VMC_HK.log file is stored in the ..\VisualLaserMarker\Trace folder.

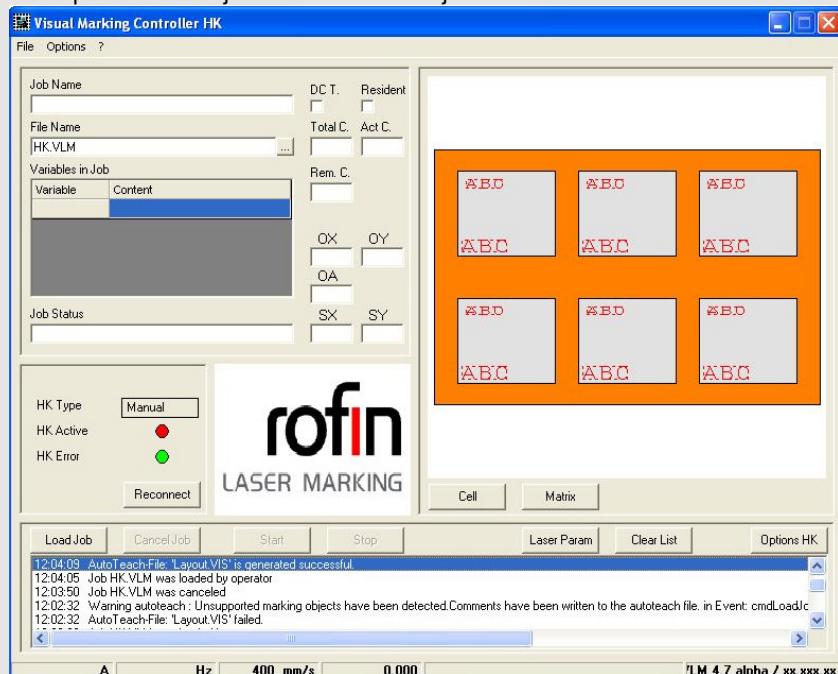
Autoteach

Autoteach On

This option supports camera systems when checking the positions and the completeness of marked objects. It is designed for creating - in the manual mode only - once a VIS file for the optical verification with an external vision system. If this option is checked a "C:\Program Files\ VisualLaserMarker\ Autoteach\Layout.VIS" file is created via the [LoadJob] button of the VLM layout, once a job has been loaded. The path for the storage location of the VIS file is set in VLM under **Editor settings...:**



Example: matrix object with two text objects:



The VIS file contains size and position specifications, matrix and contents properties to make the verification of the marking with the camera possible.

Close HK

Ask before closing

The checkbox **Ask before closing** defines whether there will be another query before closing the VMC_HK. If this option is checked another query "Do you really want to close" will appear.

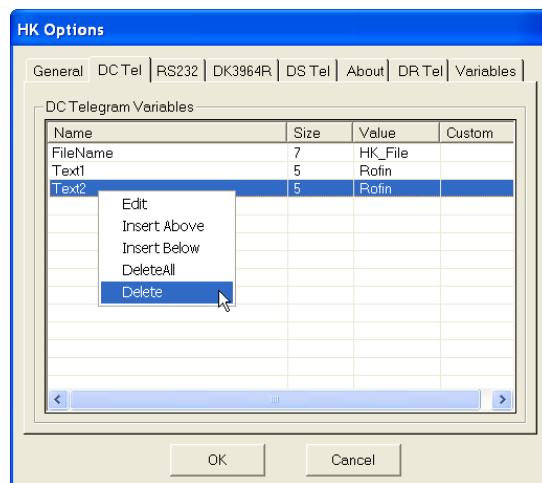
2.2 DC Tel – Definition of the DC Telegram

DC variables can be defined in the **DC Vars** screen of the **HK Options** dialog.

If the DC telegram is to be used for the host coupling, you have to define the DC telegram structure here.

The first variable is the file name which is also the name of the job. The subsequent variables are optionally and differ depending on the DC telegram. The definition of the DC variables consists of **Name**, **Size**, **Value** and **Custom**. **Name** indicates the name of the variable, that has to be defined in the VLM drawing. **Size** indicates the number of bytes in the DC telegram occupied with the appropriate variable in the telegram.

The **Value** and **Custom** columns are intended for coming implementations. Currently they are not evaluated. The DC variables are edited by clicking the right mouse button. A pop-up menu is displayed. The intended action can be selected in this menu.



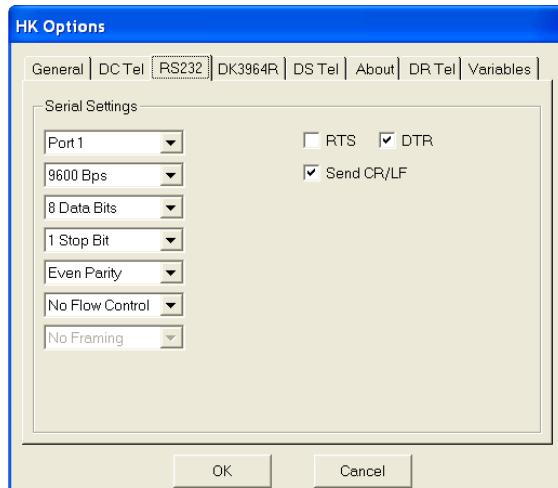
2.3 RS232 – Serial interface

When using a **RS232 HK** the following settings have to be carried out in the **RS232** screen of the **HK Options** dialog:

If the serial interface is to be used for the host coupling, the serial settings must correspond to the host settings. This is not valid for the used port.

A serial connection (RS232 only) is normally set as follows:

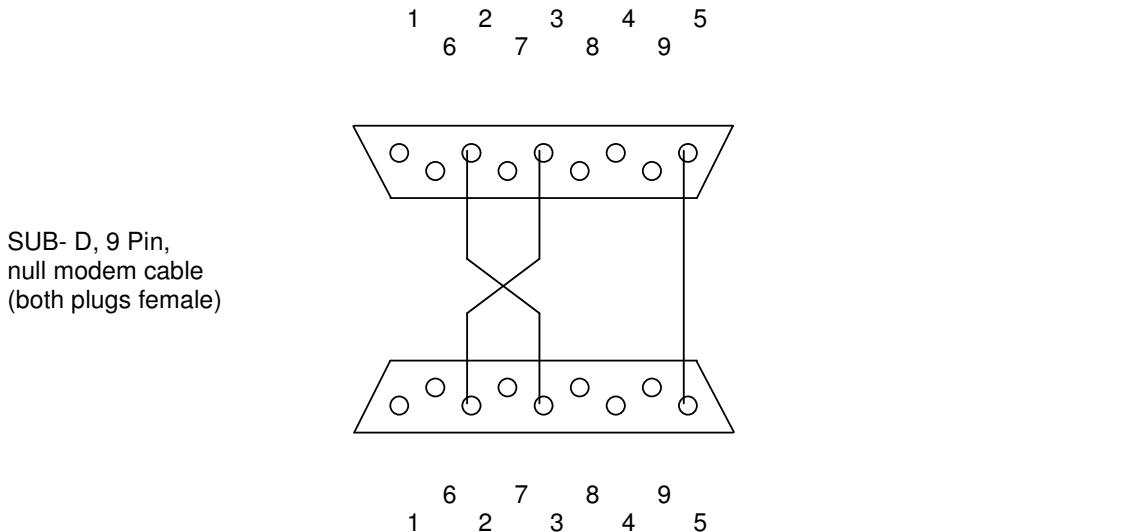
- 8 Data Bits**
- 1 Stop Bit**
- No Parity**
- No Flow Control**
- No Framing**



The end-of-text character has always to be a CR and then a LF which has to be added to data by the host. Data from the PC to the host are only terminated with a CR and a LF if the check box **Send CR/LF** is activated.

Serial connection – Hardware Requirements

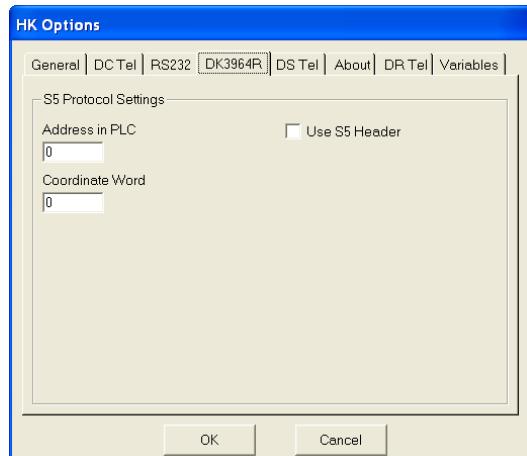
Connecting the COM interface of the laser PC with the host PC by using a crossed serial cable (null modem cable) is required for the coupling of a host PC with a laser PC.



2.4 DK3964R – Serial interface with DK3964R protocol

When using a **DK3964R HK** the following settings have to be carried out in the **DK3964R** screen of the **HK Options** dialog:

If the serial interface with **DK3964R** protocol is to be used for the host coupling in this dialog you can define whether the S5 Header (**Use S5-Header**) is to be used. For communicating with the PLC it's also possible to assign an **Address in PLC** and a **Coordinate Word**. This two parameters can be used on part of the host (PLC). If the host does not need any values, it's not necessary to enter any values.



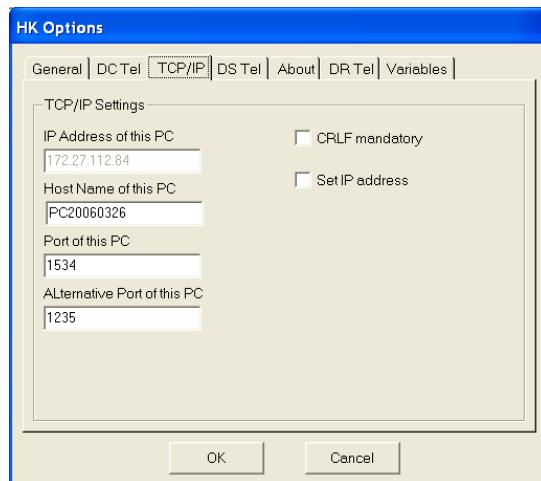
2.5 TCP/IP - Network connection

When using a **TCP/IP HK** the following settings have to be carried out in the dialog field page **TCP/IP** of the **HK Options** dialog:

For defining a **TCP/IP** server you only need to select a **TCP/IP** port. The display of the **IP Address of this PC** and of the **Host Name of this PC** are intended as a help for configuring the host client. On part of the host one of this two values and the port are needed to set up a connection with the **TCP/IP** server (VMC_HK).

CRLF mandatory forces the use of <CR><LF> at the end of a telegram, even with TCP/IP.

Set IP address allows the selection of the TCP/IP address for the use with the VMC_HK integrated TCP/IP server. This is required only for PCs with more than one network card.

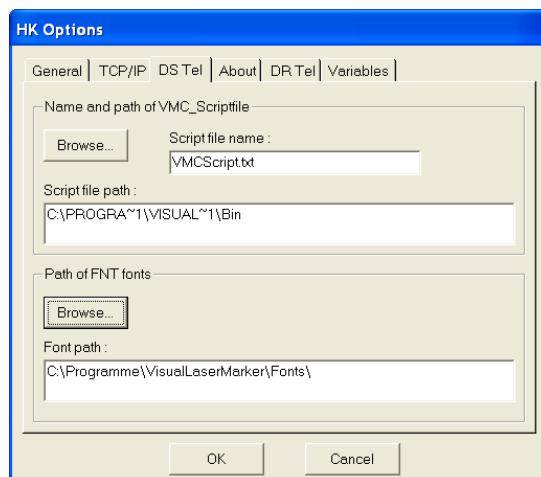


2.6 DS Telegram – Data Script Telegram

The DS Telegram is set under **HK Options** on the **DS Tel** screen.

Selecting the path and the name of the script file with .txt'.

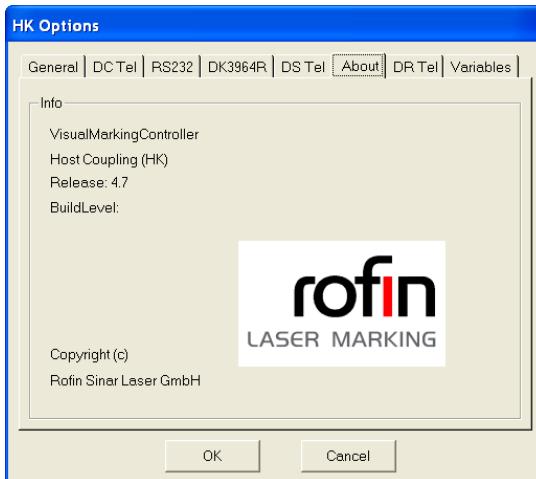
- 3 Selecting the file path of the FNT fonts in the subfolder ...\\VisualLaserMarker\\Fonts).



2.7 About – Information on the product

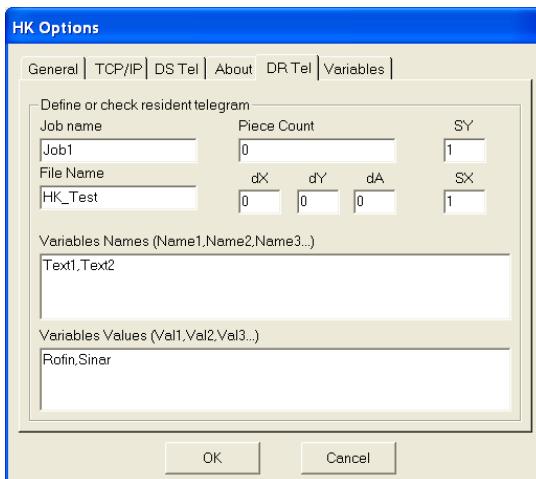
The **About** screen of the **HK Options** dialog provides the following information:

- ◆ Software version (release)
- ◆ Date of manufacture (build level)



2.8 DS Telegram – Data Resident Telegram

The DS Telegram is set under **HK Options** on the **DS Tel** screen.

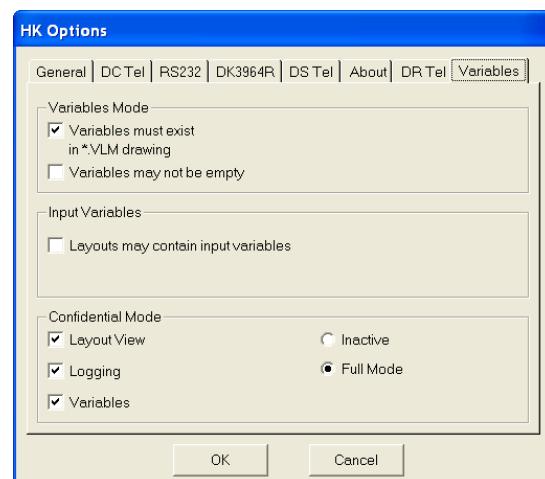


Job Name	This field serves for the setup of a DR telegram. The job name can be chosen.
File Name	This field serves for the setup of a DR telegram.
Piece Count	This field serves for the setup of a DR telegram. The number of required executions has to be entered here.
dX	Offset X. The whole drawing will be shifted in X direction in [mm].
dY	Offset Y. The whole drawing will be shifted in Y direction in [mm].
dA	Offset alpha. The whole drawing will be rotated in [°deg].
SX	Scale X. The whole drawing will be scaled in X direction by factor.
SY	Scale Y. The whole drawing will be scaled in Y direction by factor.

Variables Names	This field serves for the setup of a DR telegram. The variable names need to be separated by commas. The commas may not be followed by blanks!
Variables Values	This field serves for the setup of a DR telegram. The content of variables need to be separated by commas. The commas may not be followed by blanks!

2.9 The Variables

On the **Variables** screen you can define the behavior with regard to presence and visibility of the contents to be output with the laser.



Variables Mode

Variables must exist in *.VLM drawing

In the **Variables Mode** section you can predefine if all variables sent in the telegram have to be present in the *.VLM drawing in use. If input variables are defined in the VLM drawing a check is performed if all required input variables have been transferred from the host and if they do not exceed the determined length. If this check box is activated () an error (QN) will be returned to the host when a variable is missing in the drawing.

» General - General settings.

With this option you define, that variables must have contents. In case of empty variables an error (QN) will be returned to the host, if this check box is selected ().

3 A variable, which contains blank characters, is not empty.

Input Variables

Layouts may contain input variables

By activating the check box () the presence of input variables in the VLM file is defined.

» Section 'Definition of VLM input variables'.

Confidential Mode

In this section it is possible to activate various options for the production of safety-related data, » section '*The Confidential Mode*'.

- 3 The program now needs to be closed down and restarted for the changes to take effect.

Layout view	When this check box is selected (<input checked="" type="checkbox"/>) , the contents of a layout cannot be read.
Variables	If this check box is selected (<input checked="" type="checkbox"/>) , the contents of variables cannot be read.
Logging	If this check box is selected (<input checked="" type="checkbox"/>) , the status list and the VMC HK logfile cannot be read.
Inactive	If this check box is selected (<input checked="" type="checkbox"/>) , the Confidential Mode is not activated.
Full Mode	If this check box is selected (<input checked="" type="checkbox"/>) , the Confidential Mode is activated.

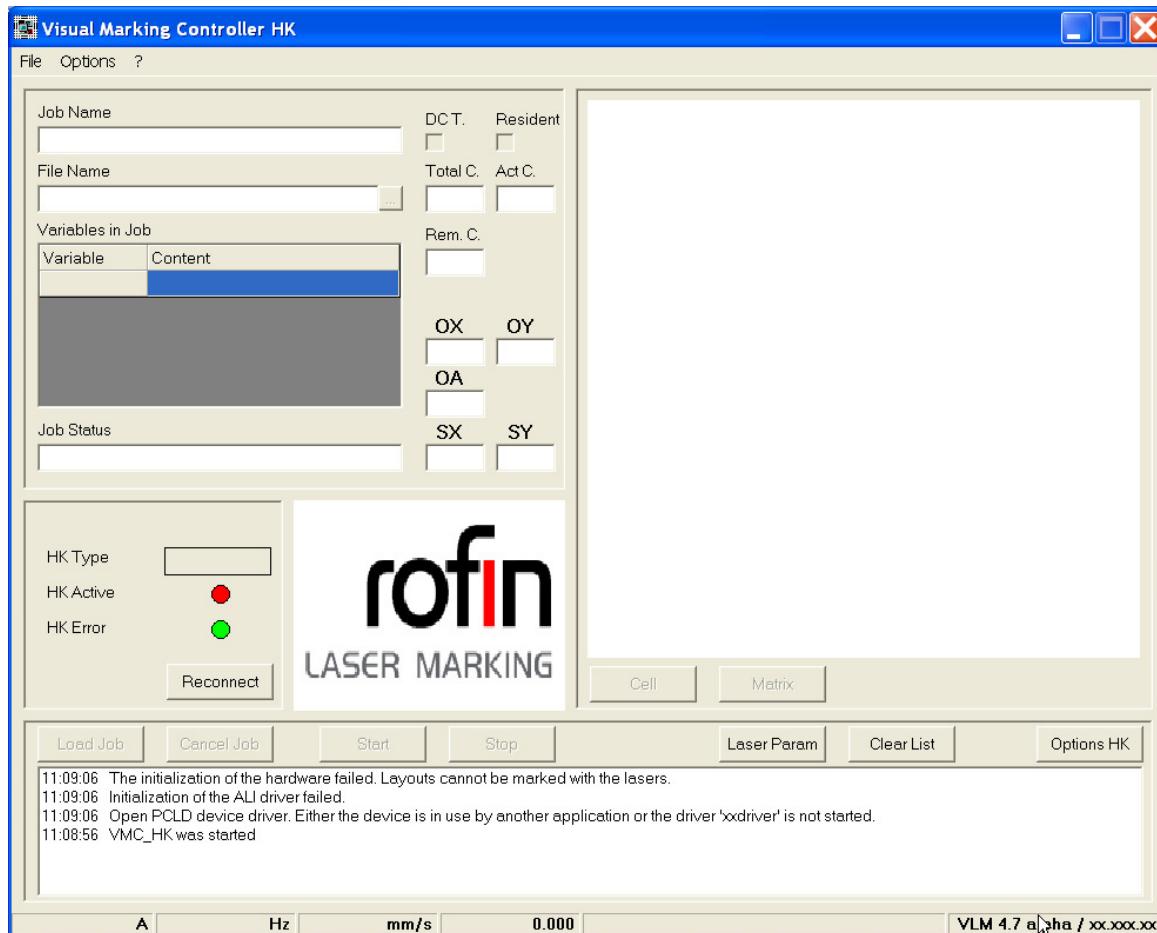
3 Operating the VMC_HK

In the application the VMC_HK is mainly operated remote-controlled. The configuration of the VMC_HK is done via the [Options HK] button.

3.1 Starting the VMC_HK

The VMC HK custom tool is executed via **Start / VisualLaserMarker / VMC_HK**.

After successful connection to an interface which has been used most recently, the following main window of the VMC_HK production tool appears:

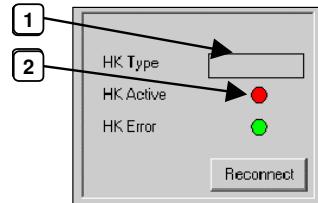


If in the UserManager the section HK_START is activated, the user and the password are requested when starting the VMC_HK, to determine if authorization to start the VMC_HK was granted. » *Section 'The User Manager connection'*.



When the connection initialisation with an interface which has been used most recently or in the manual mode failed, the following main window of the VMC_HK production tool appears:

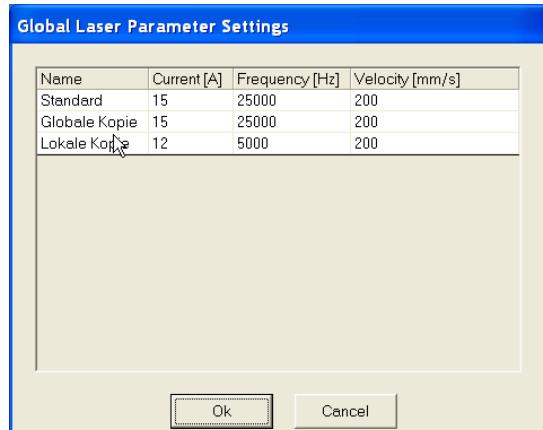
If the HK interface could not be initialized, no HK type is shown (1). The red HK active LED (2) then lights up.



3.2 Changing global laser parameters

The **Global Laser Parameter Settings** dialog is required for editing the global laser parameters manually. For this purpose open the dialog using the button **[Laser Param]**.

The values for **Power**, **Frequency** and **Velocity** may be modified for each global laser parameter.

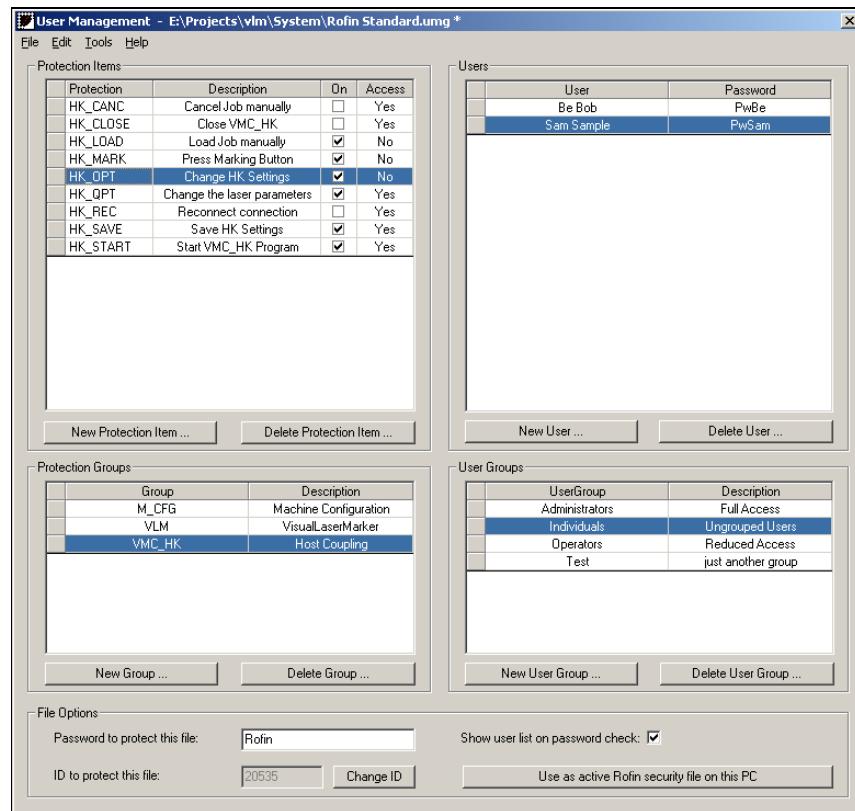


3.3 The User Manager connection

Several actions in the VMC_HK are protected with a password. These passwords may be assigned by using the **User Manager** program. It is also possible to create users and individual accesses to the individual actions of the VMC_HK may be set up (access column) for this users. The password protection may be activated or deactivated for each action (On column).

For a detailed description of the User Manager refer to the **User Manager** manual.

User Manager with VMC_HK actions



3.4 Protected sections of the VMC_HK

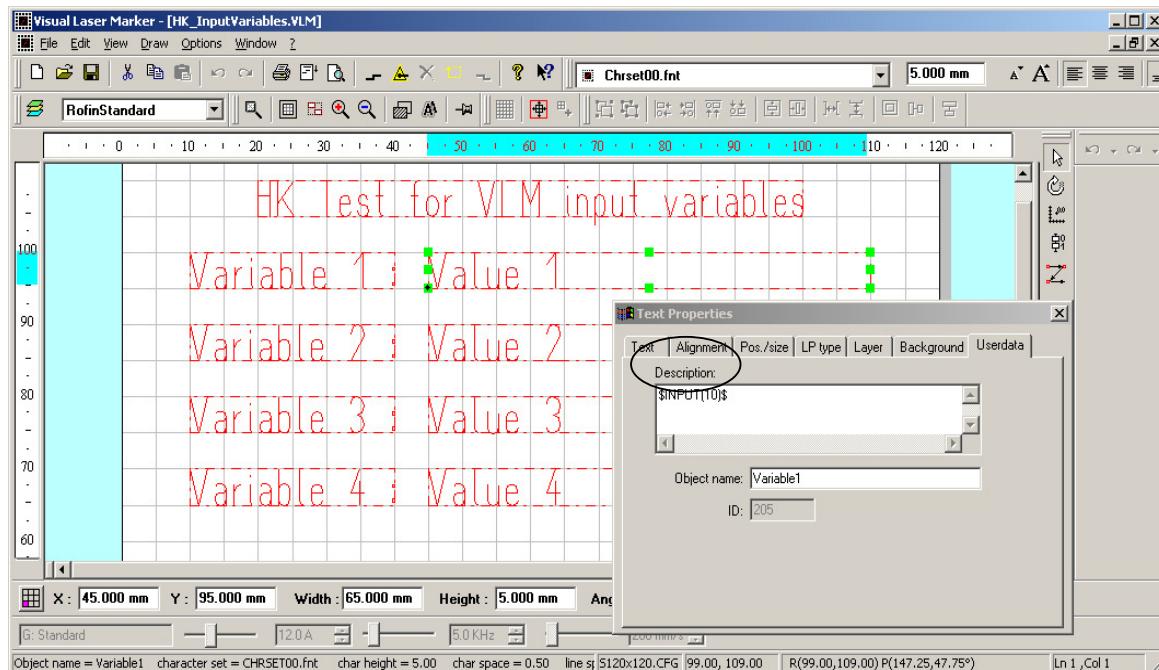
The following sections of the **User Manager** may be activated in the ON column. If activated, authority checks will be performed for them in the VMC_HK.

HK_CANC	Enables or prevents cancelling a loaded job by using the [Cancel Job] button. Only in the manual mode.
HK_CLOSE	Enables or prevents exiting the VMC_HK program.
HK_LOAD	Enables or prevents loading a job by using the [Load Job] button. Only in the manual mode.
HK_MARK	Enables or prevents executing (marking) a VLM drawing with the laser.
HK_OPT	Enables or prevents accessing the options dialog.
HK_QPT	Enables or prevents accessing the laser parameter dialog.
HK_REC	Enables or prevents a new connection by using the [Reconnect] button.
HK_SAVE	Enables or prevents saving modified settings in the options dialog.
HK_START	Enables or prevents starting the VMC_HK program.

3.5 Definition of VLM input variables

It is possible to check if all required input variables are included inside the host data. For this purpose, input variables have to be defined in the VLM files. Input variables must be defined in the VLM program in the MO properties -> **User data** -> **Description**. In the **HK Options** -> **General** -> **Variables Mode** you can enable the input variables to be checked.

» *Section 'The Variables'.*



In above example a input variable with name "Variable1" and a maximum length of 10 characters is defined.

Syntax:

\$INPUT\$	Input variable with no length definition
\$INPUT(<Length>)\$	Input variable with length definition

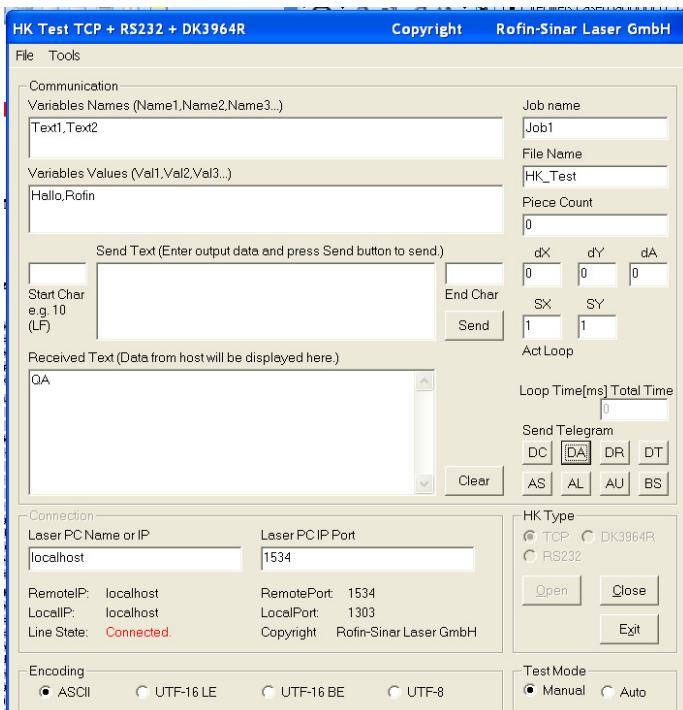
If a length is specified, the transmitted host data must not exceed the specified length. Otherwise a 'QN' is sent to the host.

3.6 The Confidential Mode

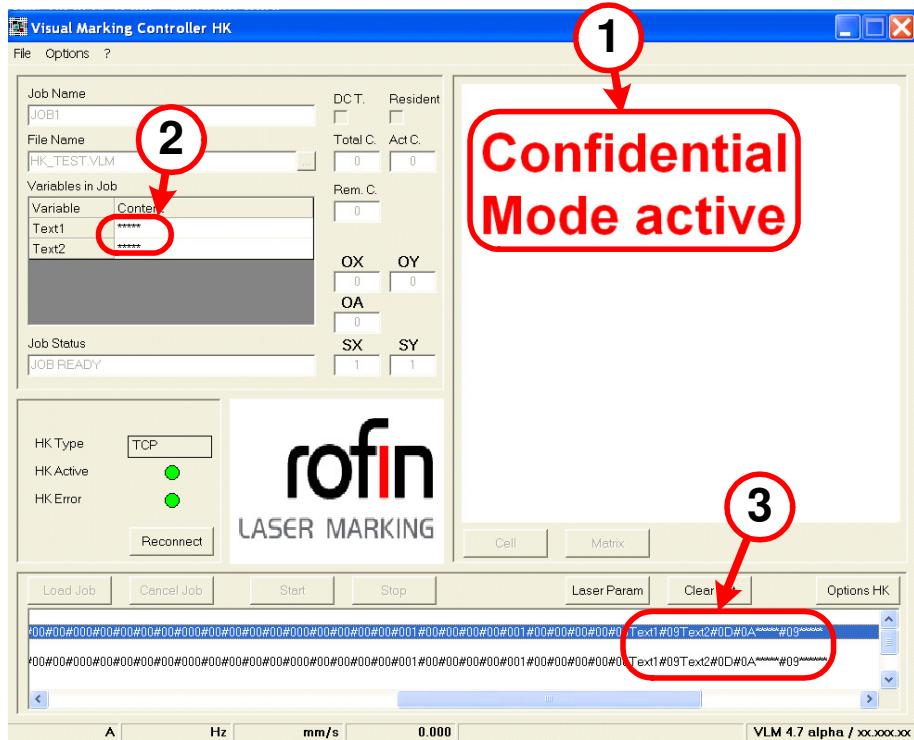
This mode was developed for the production of safety-related data, for example, identity documents. When this mode is active, several areas can be protected in the VMC-HK ensuring that users may process safety-related data preventing the data to be read.

The management of user permissions via User Manager determines the options which may be activated in the VMC_HK. In the HK Options can then be activated or deactivated the **Layout view**, **Variables** and **Logging** areas by using the corresponding permissions, » section *The Variables*:

The variables “Text1“and “Text2“ are protected in the following example.



The protected areas are displayed in the VMC_HK as follows:



Layout

The contents of the layout cannot be read. Instead, the text '*Confidential Mode active*' appears (1).

Contents of the table of variables

Asterisks are used to replace the contents of variables (2).

Status list and logfile

Asterisks are also used to replace contents of the status liste and the logfile (3).

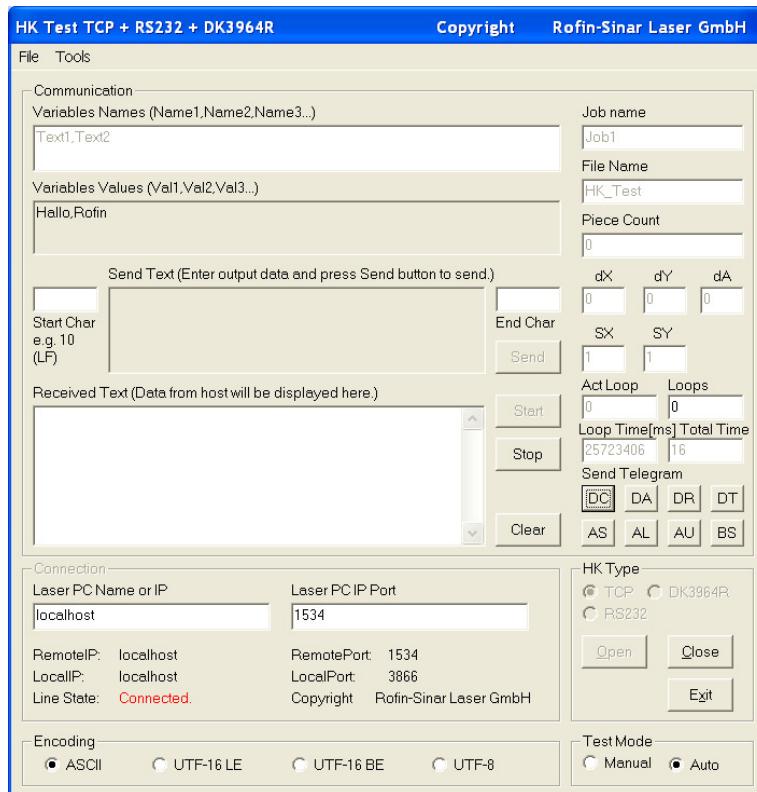
3.7 The HK_Test Tool

The **HK_Test Tool** is a software based communication on the following protocols:

- ⇒ serial protocol RS232
- ⇒ serial protocol RS232 with DK3964R protocol
- ⇒ TCP/IP

With the HK_Test Tool it is possible to create Rofin-Sinar-specific HK telegrams which can be transferred by using the selected protocol. Using the HK_Test Tool a host can be simulated for sending and receiving test data from and to VMC_HK.

The HK_Test Tool can also be used for the communication with any other applicationen by communicating via RS232, DK3964R or TCP/IP.



If the TCP/IP communication mode is used, the remote station (e.g. VMC_HK) has to implement a TCP/IP server where the HK_Test Tool is implemented as a client only.

Communication

Variables Names	This field serves for the setup of a DA telegram. The variable names need to be separated by commas. The commas may not be followed by blanks!
Variables Values	This field serves for the setup of a DC, DA, DR and DT telegram. The content of variables need to be separated by commas. The commas may not be followed by blanks!
Send Text	In this input field any text can be sent using the return-key.
Start Char	Any character e.g. STX (2) or CR(13) can be set as the first character in front of the text of the field Send Text .
End Char	Any character, e.g. ETX (3) or LF(10) can be set as the last character after the text of the field Send Text .
Received Text	Here the received text is shown (sent from the VMC_HK).
[Send]	Click on this button to send the text entered in the field Send Text .

[Start]	Click on this button to start the Auto Mode . This sends the telegrams from the specified telegram file to the VMC_HK and checks the reply. This automatic mode is active until the number of telegrams specified in the loops has been sent.
[Stop]	Click this button to stop the automatic communication mode which has been activated with the [Start] button (Auto Mode) at any time.
[Clear]	Click on this button to reset the loops counter of the interrupted automatic mode after the automatic mode has been stopped. If you click on [Start] instead of [Clear] the automatic test will be continued with the current loop counter.
Job Name	This field serves for the setup of a DA telegram. The job name can be chosen.
File Name	This field serves for the setup of a DC and a DA telegram. The required VLM layout is entered here.
Piece Count	This field serves for the setup of a DA telegram. The number of required executions has to be entered here. If the piece count is set to 0, the counter is set to infinite.
dX	Offset X. The whole drawing will be shifted in X direction in [mm].
dY	Offset Y. The whole drawing will be shifted in Y direction in [mm].
dA	Offset alpha. The whole drawing will be rotated in [°deg].
SX	Scale X. The whole drawing will be scaled in X direction by factor.
SY	Scale Y. The whole drawing will be scaled in Y direction by factor.
Act Loop	Only in the Auto Mode. The number of entries in the archive is shown here. The value specified in the loops is the maximum value.
Loops	Only in the Auto Mode. Required number of telegrams to be executed. If the number of defined telegrams in the telegram file is smaller, the telegram list will be sent repeatedly until the number of loops has been reached.
Loop Time [ms]	Only in the Auto Mode. Communication time of the telegram sent most recently until the reply telegram has been received.
Total Time	Only in the Auto Mode. Total time of all telegrams sent up to now and the corresponding reply telegrams.
Send Telegram	This buttons serve for sending the telegrams named on the buttons. Before using this buttons, the fields named above have to be filled.
[DC] / [DA] / [DR] / [DT] / [AS] / [AL] / [AU] / [BS]	

Connection

Laser PC Name or IP	Only in the TCP/IP communication mode. Specification of the IP address of the PC on which the VMC_HK is installed. Instead of the IP address it is also possible to specify the name of the PC in a network with name resolution.
Laser PC IP Port	Only in the TCP/IP communication mode. This is where you have to configure the port for the TCP/IP communication.

HK Type

In the **HK Type** section it is possible to specify various communication protocols for the communication with a remote station such as VMC_HK.

TCP	TCP/IP network connection.
DK3964R	Serial connection with DK3964R protocol.
RS232	Serial connection without special protocol.

Encoding

ASCII	All telegrams can be sent without unicode.
UTF-16LE	Each character in the telegram is displayed with 2 bytes. With UTF-16LE the lowbyte is sent first and the highbyte afterwards. The UTF-16LE's identifier is <0xFF><0xFE>. Example: <0xFF><0xFE>D<0>T<0>V<0>a<0>l<0>u<0>e<0>1<0><tab><0>V<0>a<0>l<0>u<0>e<0>2<0>
UTF-16BE	Each character in the telegram is displayed with 2 bytes. With UTF-16BE the highbyte is sent first and the lowbyte afterwards. The UTF-16BE's identifier is <0xFE><0xFF>. Example: <0xFE><0xFF><0>D<0>T<0>V<0>a<0>l<0>u<0>e<0>1<0><tab><0>V<0>a<0>l<0>u<0>e<0>2
UTF8	The whole telegram is sent as UTF8 string. This coding is denoted by the prefixed identifier <0xEF><0xBB><0xBF>. For a detailed description about the UTF 8 coding refer to: http://www.cl.cam.ac.uk/~mgk25/unicode.html .

Test Mode

Manual	In the manual mode it is possible to send individual telegrams by using the buttons in the Send Telegram section or by using the button [Send].
Auto	With the automatic mode you can perform endurance tests. » <i>For a detailed description refer to section 'The automatic mode'.</i>

3.7.1 Installing the HK_Test Tool

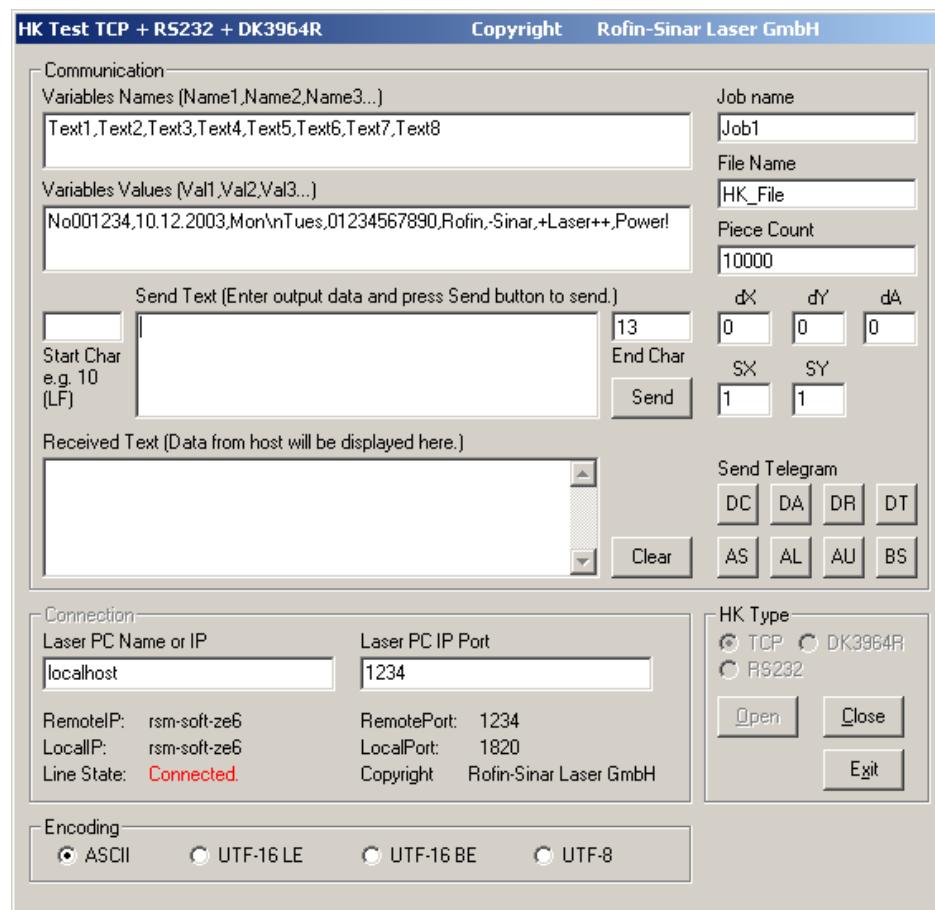
The HK_Test Tool does **not** require the installation of the marking software Visual Laser Marker. It can be installed on any Windows NT, 2000 or XP computer!

To install HK test tool, run **HK_Test.EXE**. If a VLM has been installed on the PC, the HK_Test-Tool has been installed automatically and can be found under VisualLaser Marker/ Tools. This file is found in the HTM document of the VLM-CD. If the browser will not be started after insertion of the VLM CD, the installation may be started manually. Thereto run the **HK_Test.EXE** which is located in the directory CD-ROM/Bin. The installation is performed in an existing ...\\Programs\\VisualLaserMarker\\Bin directory. If this directory does not reside, the directory ...\\Programme\\VisualLaserMarker\\Bin will be created on the appropriate PC. After the installation the Test-Tool may be started via Start/VisualLaserMarker/Tools.

3.7.2 TCP/IP Mode

The name of the PC which contains the installation of the VMC_HK has to be set in order to open a **TCP/IP** connection, is registered. The name is displayed in the VMC_HK options under TCP/IP. In addition, the same port at the VMC_HK and the **HK Test Tool** has to be registered. If this is done, the connection can be opened and the VMC_HK error-LED alights green.

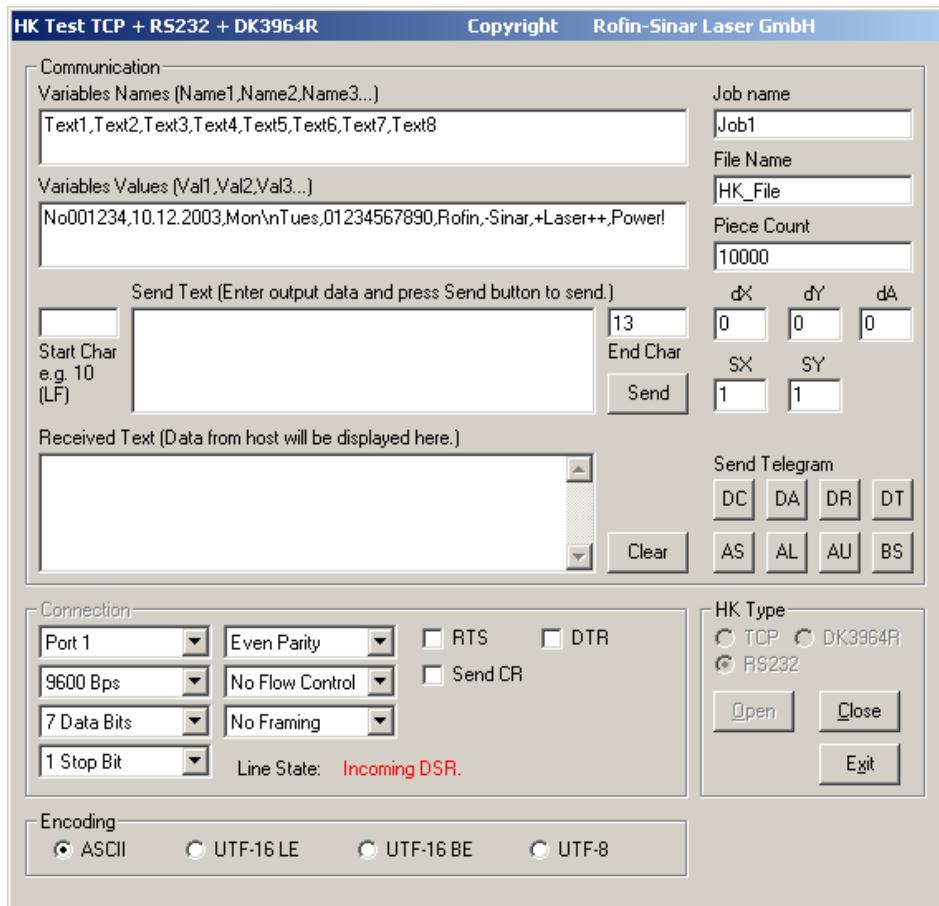
TCP/IP Mode screen



3.7.3 RS232 Mode

Except for the port that is used, the serial settings have to be identical to the options set in the VMC_HK. Having this done, the connection can be opened and the **Line State** displays **Connected**.

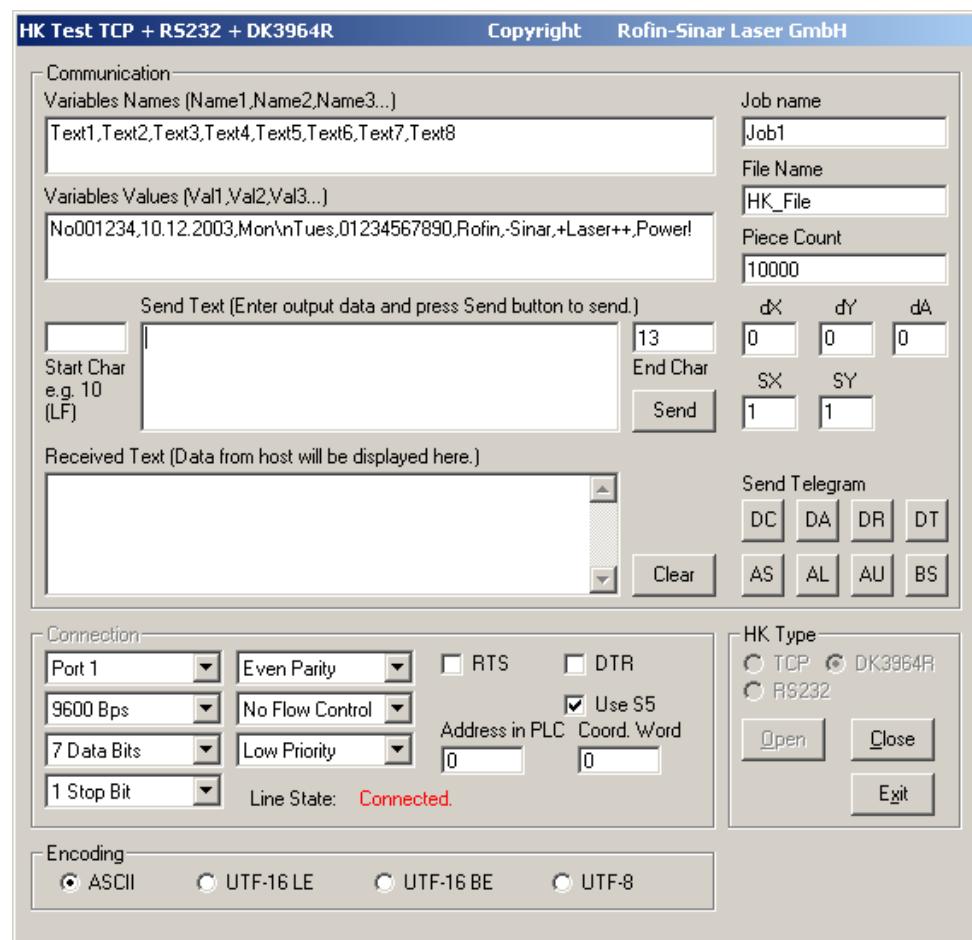
RS232 Mode screen



3.7.4 DK3964R Mode

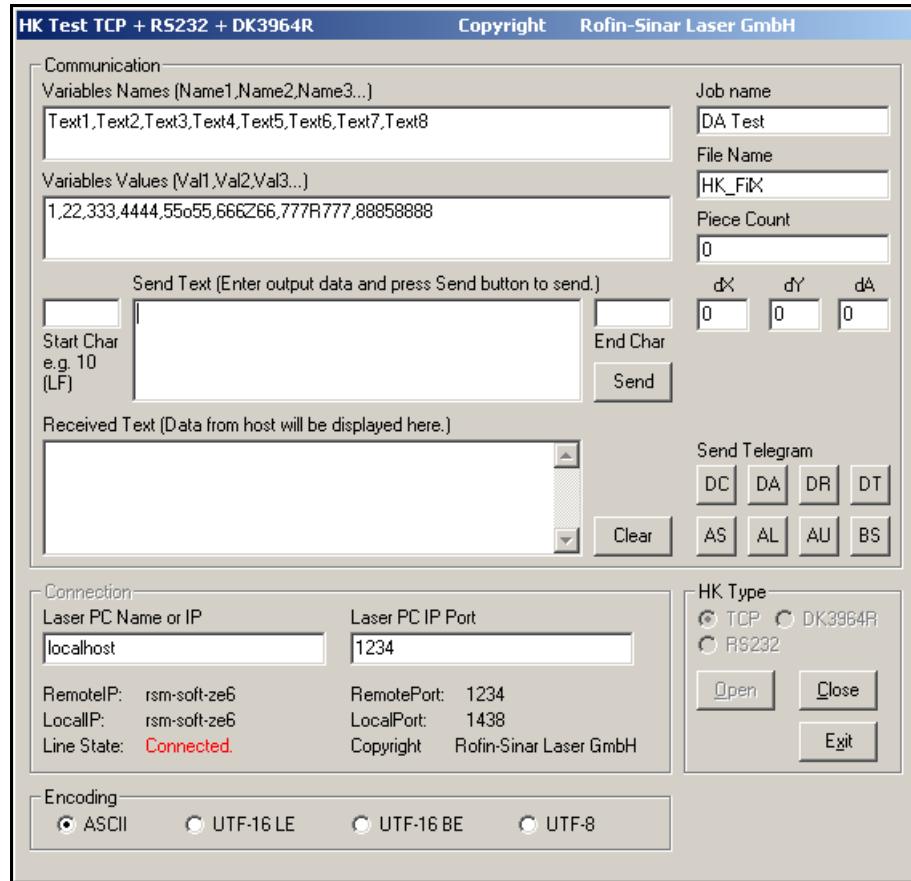
Except for the port that is used, the DK3964R settings have to be identical to the options set in the VMC_HK. Having this done, the connection can be opened and the **Line State** displays **Connected**.

DK3964R Mode screen



3.7.5 Telegram settings

Communication screen



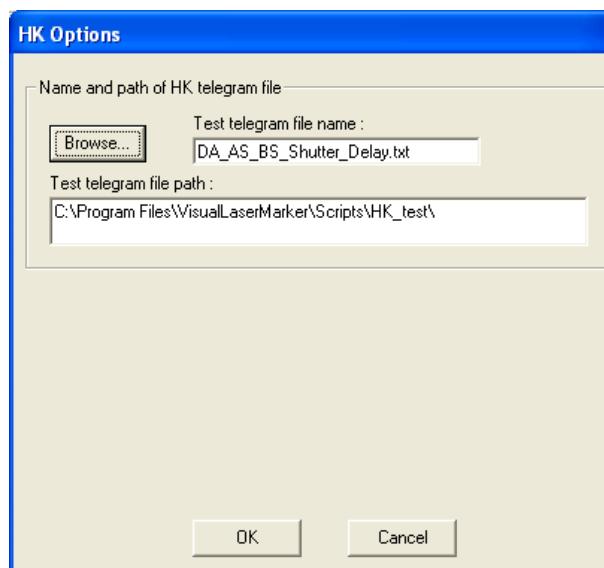
Variables Names	This field serves for the setup of a DA telegram. The variable names need to be separated by commas. The commas may not be followed by blanks!
Variables Values	This field serves for the setup of a DC, DA, DR and DT telegram. The content of variables need to be separated by commas. The commas may not be followed by blanks!
Job Name	This field serves for the setup of a DA telegram. The job name can be chosen.
File Name	This field serves for the setup of a DC and a DA telegram.
Piece Count	This field serves for the setup of a DA telegram. The number of required executions has to be entered here.
dX	Offset X. The whole drawing will be shifted in X direction in [mm].
dY	Offset Y. The whole drawing will be shifted in Y direction in [mm].
dA	Offset alpha. The whole drawing will be rotated in [°deg].
SX	Scale X. The whole drawing will be scaled in X direction by factor.
SY	Scale Y. The whole drawing will be scaled in Y direction by factor.

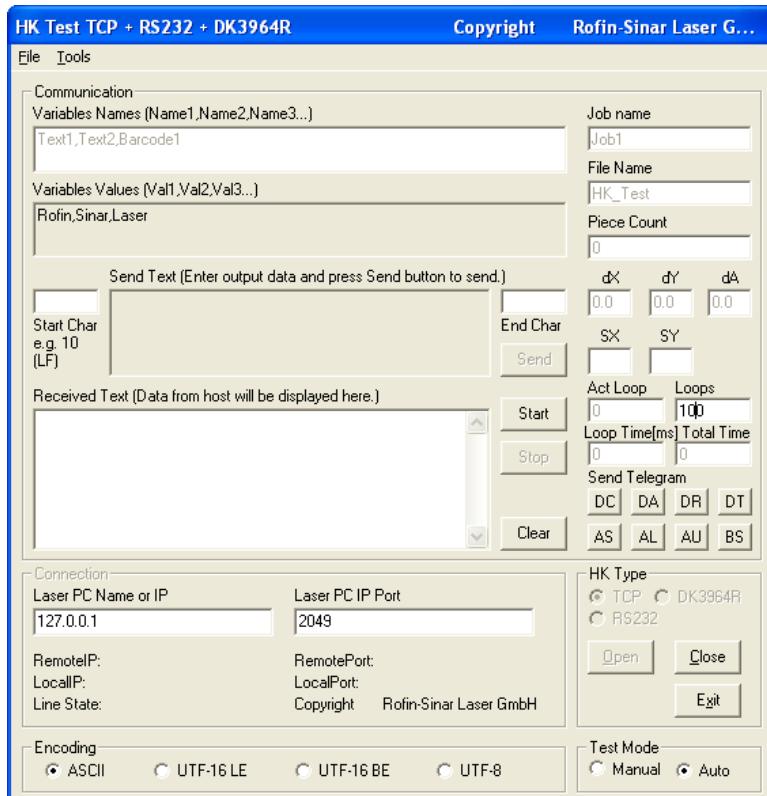
Send Telegram	This buttons serve for sending the telegrams named on the buttons. Before using this buttons, the fields named above have to be filled.
Send Text	In this input field any text can be sent using the return-key.
Start Char	Any character e.g. STX (2) or CR(13) can be set as the first character in front of the text of the field Send Text .
End Char	Any character, e.g. ETX (3) or LF(10) can be set as the last character after the text of the field Send Text .
Received Text	Here the received text is shown (sent from the host).

3.7.6 The automatic mode

If you want to perform an endurance test select under **Tools / Optionen** a testfile and restart the HK_Test Tool. Select **Auto** in the HK test, in the loops set e.g. 100 and then the press the **[Start]** button to start the automatic test.

- 3 The test telegram file can contain any number of telegrams. If the number of loops is smaller than the number of telegrams contained in the test telegram file, only the first loop telegrams will be executed. If the telegram file contains less telegrams than entered loops, the telegrams will be repeated until the loop counter has been reached.





Act Loop	The number of entries in the archive is shown here. The value specified in the loops is the maximum value.
Loops	Required number of telegrams to be executed. If the number of defined telegrams in the telegram file is smaller, the telegram list will be sent repeatedly until the number of loops has been reached.
Loop Time [ms]	Communication time of the telegram sent most recently until the reply telegram has been received.
Total Time	Total time of all telegrams sent up to now and the corresponding reply telegrams.
[Start]	Click on this button to start the Auto Mode . This sends the telegrams from the specified telegram file to the VMC_HK and checks the reply. This automatic mode is active until the number of telegrams specified in the loops has been sent.
[Stop]	Click this button to stop the automatic communication mode which has been activated with the [Start] button (Auto Mode) at any time.
[Clear]	Click on this button to reset the loops counter of the interrupted automatic mode after the automatic mode has been stopped. If you click on [Start] instead of [Clear] the automatic test will be continued with the current loop counter.

Example of a test telegram file:

DA_AS_BS_Shutter_Delay.txt - Notepad

```

File Edit Format View Help
/////////////////////////////////////////////////////////////////////////
// Allowed telegram items:
/////////////////////////////////////////////////////////////////////////
TelemetryType - values: "DC", "DA", "DT", "DR", "AS", "AL", "AU", "BS", "DS", "SPECIAL". "SPECIAL" only sends sendText value
JobName - values: e.g. "job_test", free selectable
VLMfilename - values: VLM file to be loaded for DC or DA job
VariablesNames - values: Name of HK variables used in VLM drawing
Variablesvalues - values: Content to be filled in variables in VLM drawing
PieceCount - values: "0" for infinite or a number. Only valid for DA telegrams
dx - values: decimal
dy - values: decimal
dAngle - values: decimal
dscaleX - values: decimal
dscaleY - values: decimal
StartChar - values: e.g. "10" for LineFeed Or "13" for Carriage Return
SendText - values: Any content for telegram type "SPECIAL" or "DS"
EndChar - values: e.g. "10" for Linefeed Or "13" for Carriage Return
ExecuteDelay - values: e.g. "0" for no delay, "100" for 100ms, delay of sending the telegram in ms
ReplyTelegram - values: "QA" for success, or "QN" for failure, or other expected telegram.
                    IF empty next telegram is sent immediately.

Any combination of the above items is allowed. The sequence is free selectable.
All items must be in one line for each telegram, separated by semicolon and a space character
/////////////////////////////////////////////////////////////////////////
TelegramType=DA; JobName=Job1; VLMfileName=HK_Test; VariablesNames=Text1,Text2,Barcode1; Variablesvalues=Rofin,Sinar,Laser;
PieceCount=0; dx=0.0; dy=0.0; dAngle=0.0; ReplyTelegram=QA
TelegramType=AS; ReplyTelegram=BE
TelegramType=BS; ReplyTelegram=BE
TelegramType=DS; SendText=0$; Laser;GetStatus;shutter; ReplyTelegram=*; ExecuteDelay=10000
TelegramType=AL; JobName=Job1; ReplyTelegram=QA

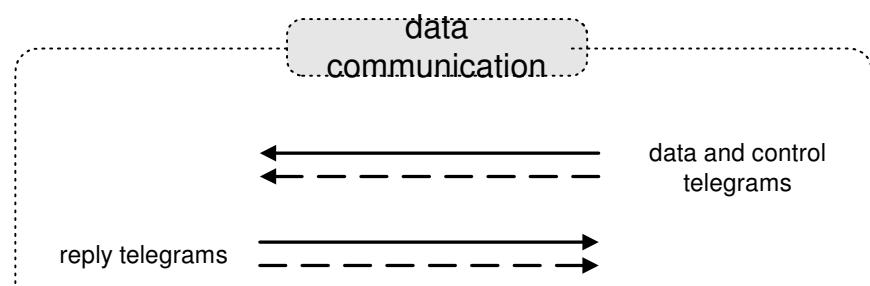
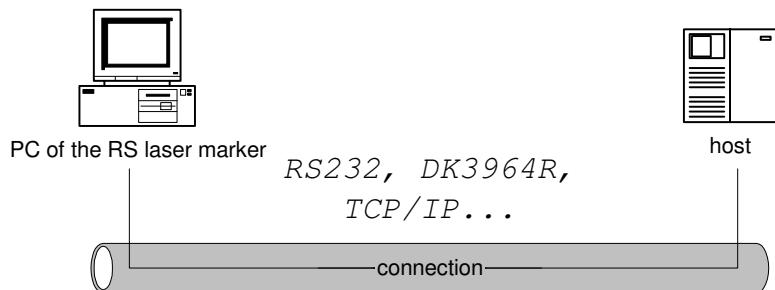
```

4 The VMC_HK telegram structure

This chapter describes the telegrams and their structure which are needed for the communication with a Rofin Sinar laser.

4.1 Description of the interfaces for the host coupling

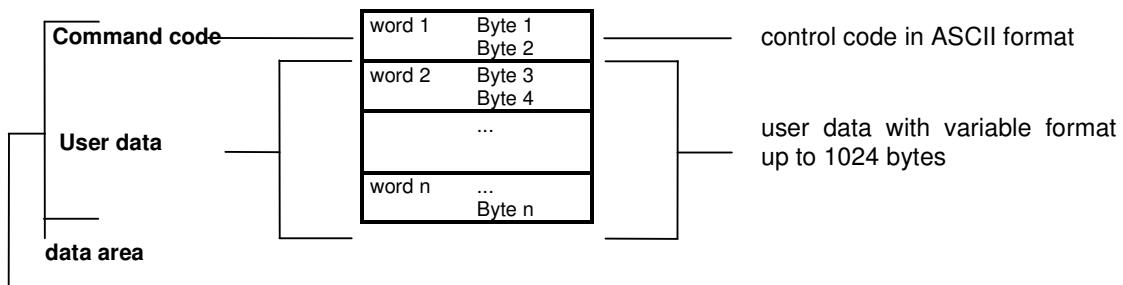
The data exchange between Rofin Sinar laser PC and host is carried out with identical telegrams independently from the HK type.



4.2 Structure of the telegrams

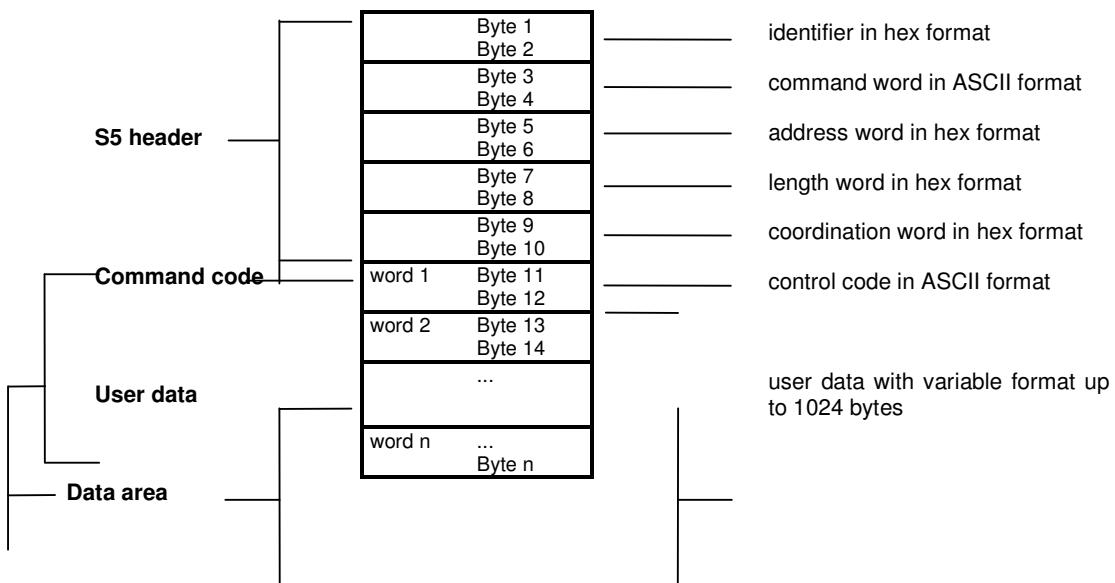
4.2.1 Structure without S5 header (DK3964R)

The telegram structure is as follows:



4.2.2 Structure with S5 header (DK3964R)

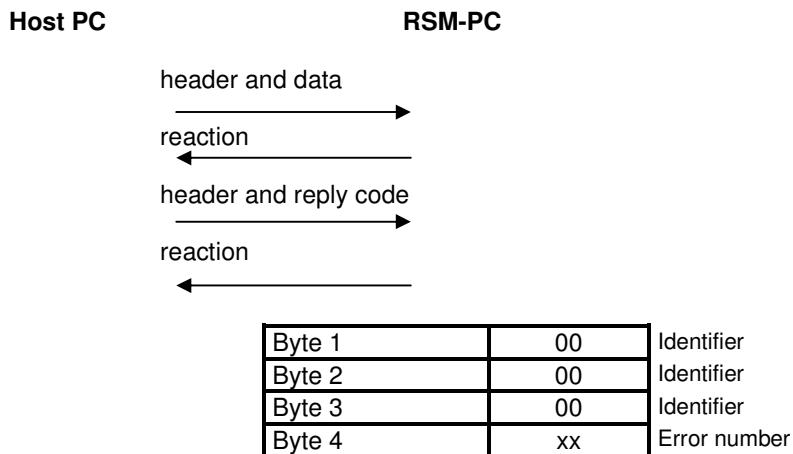
The telegram structure is as follows:



4.2.3 S5 header (DK3964R)

The **S5 header** consists of 10 bytes. Please consider that the number of the data words and not that of the data bytes has to be entered in the bytes 7 and 8. A feedback is given after the data have been sent:

Telegram procedure:



Error codes:

0 = data accepted

1 = skeletal error interpreter; data cannot be filed by the interpreter

The data area

The tape of the telegram is determined with the control code. The length and the meaning of the data depends on the type of the telegram.

4.3 Telegrams from the host to the laser marker

The following telegrams from the host to the laser marker are used:

- ◆ DA telegram (job telegram)
- ◆ DT telegram (variable data telegram)
- ◆ DR telegram (resident job telegram)
- ◆ DC telegram (customized job telegram)
- ◆ DS telegram (script/special telegram) NEW in VLM 3.0B Build 5.331.16
- ◆ AS telegram (start of job-telegram)
- ◆ AU telegram (interrupt job)
- ◆ AL telegram (delete job)
- ◆ BS telegram (start of marking telegram).

For telegram examples see the end of this section.

4.3.1 DA telegram (job telegram)

The telegram has the following structure:

Command code	Byte 1 Byte 2	DA	job telegram
	Byte 3 ... Byte 22	XX	name of the job
	Byte 23 ... Byte 28	XX	number of pieces
	Byte 29 Byte 30	XX	number of images
	Byte 31 ... Byte 50	XX	VLM file
User data	Byte 51 ... Byte 56	XX	X offset
	Byte 57 ... Byte 62	XX	Y offset
	Byte 63 ... Byte 68	XX	α -Offset
	Byte 69 ... Byte 74	XX	scaling X
	Byte 75 ... Byte 80	XX	scaling Y
	Byte 81 ... Byte n	XX	variable data

All telegram data is indicated in ASCII format. Bytes not used have to be filled with 0 hex. The scaling values and the number of images are filled with 0 hex (fields are only available for reasons of compatibility with host couplings with LWB).

The variable data consist of a command code, to which the names of the variable data will be transmitted and a control code with the contents of the variable data.

The entries are separated by <TAB>; the variable names and values are terminated by <CRLF>. The allocation and the sequence of variable data is determined by the command code.

A job accepted will be answered by the laser marker with a QA telegram (variable data accepted), an incorrect job will be answered with a QN telegram (variable data incorrect). If currently the same job is loaded, the new variables will be taken over and the response will be a QA telegram.

If the piece number 0 is defined as ASCII character 0, the job will become infinite. As a result it will not be finished automatically. It can only be finished by using an AL telegram.

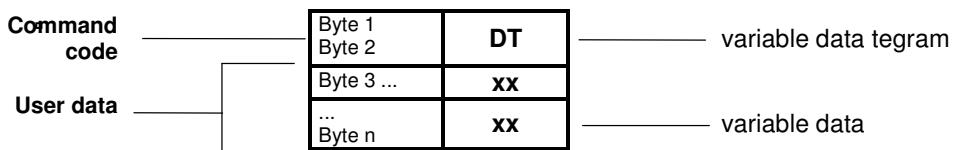
X and Y offset values are in mm, the α offset in $^{\circ}$ (0° - 360°). X and Y scalings are to be set as a factor. A factor of 1 is the original size of the VLM drawing.

4.3.2 DR telegram (resident job telegram)

The resident job telegram is identical with the DA telegram. However, the job will be entered as a resident job and cannot be deleted with an AL telegram (delete job). The DR telegram will be listed further more for reasons of compatibility with the OS/2 host coupling. There is currently no pile of jobs available. An appropriate use of resident jobs is thus not possible.

4.3.3 DT telegram (variable data telegram)

New data for the job already activated can be transferred with this telegram (only when combined with the DA telegram). The variable data have to be completely transferred. The allocation of the variable data is done by the command code of the last job transferred with the DA telegram.



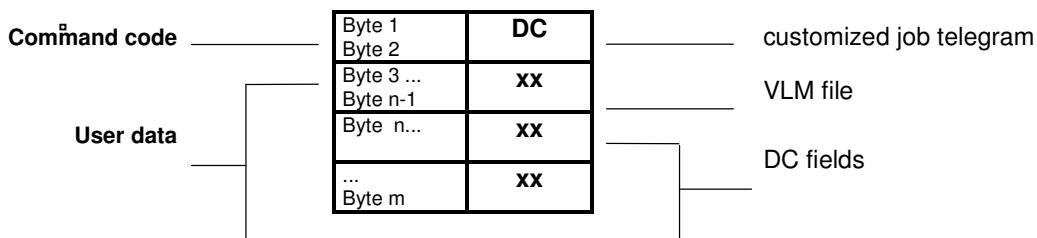
The variable data telegram will be answered by the laser marker with the QA telegram (variable data accepted) or with the QN telegram (variable data incorrect).

4.3.4 DC telegram (customized job telegram)

This is a special data format (customized) with a simplified telegram.

This telegram is divided into DC fields. The length of the fields may vary, but it has to be previously defined. The purpose of this representation is the linking to PLC control devices with fixed data structure and applications with only one kind of job. Only various drawings can be selected. The data structure which has been initialised is valid for all drawings of the system.

The size and the number of the data fields is defined in the options of the VMC_HK. At least the VLM file must be included in the telegram, which is also the first variable to define (e.g. DCFfile1). The following fields contain the variable data text. If the VLM file does not change, only the variable data will be interpreted. A new VLM file will change the job in the laser marker.



Initialising example:

Application:	HOSTINTERFACE (VLM file name)
Name of variable data:	DCFfile1, DCFfile2, DCFfile3, DCFfile4
Size of variable data:	30, 20, 26, 26, 12

The field limits are defined by the initialised values, so that special separators may be omitted. Bytes not used have to be filled with 0 hex.

A job accepted will be answered by the laser marker with a QA telegram (variable data accepted), an incorrect job will be answered with a QN telegram (variable data incorrect).

4.3.5 AS telegram (start of job)

The job has to be activated before execution (with DA telegram). This is done with the AS telegram and optionally by indicating the job to be activated.

Command code	Byte 1 Byte 2	AS	start of job
User data	Byte 3 ... Byte 22	xx	name of the job

If no job name is specified, the current and only possible job will be activated. If no job name is specified, bytes 3 – 22 remain unused; i.e. no filling with 0 and no transmission will take place for bytes 3 – 22. The length of the job name may not exceed 20 characters. If the job name is shorter than 20 characters, the remaining characters have to be filled up with hex 0. The specification of a job name is for historical reasons and not required for the VMC_HK.

4.3.6 DS Telegram (Script/Special Data)

General:

Command code	Byte 1 Byte 2	DS	Special or script telegram
User data	Byte 3 ... Byte n	xx	Variable data

This telegram is divided into two types:

- 1) The first group treats the get quality and set quality parameter sets and fonts, the laser status, the power measurement, times, vision system commands etc...

E.g.: DS;VB;GETQP;Standard;Current
Global laser parameter may be queried and changed.

- 2) The second group deals with all types of VMC_Script functions.

In the VMC_HK one or more functions can be programmed in VisualBasic Script in a script file (e.g. VmcScript.txt). The VB script functions are found in the script file set in the options ((» *DS Telegram – Data Script Telegram*). In this functions the LmosActX programming interface may be used via the VLMActX object. In addition, the FileSystemObject programming interface may be used via the fso object.

E.g.: DS;VMCSCRIPT;ActivateLayer "Layer2",true
In this example the script function "ActivateLayer" with the parameters "Layer2" (corresponds to a Layer Layer2 in a VLM drawing) and the true parameter (corresponds to activate layer) is requested.

The "ActivateLayer" function is defined in the VMC_HK script file (e.g. VmcScript.txt):

```
Function ActivateLayer(strLayer, bLaserable)
    Dim Layer1
    Set Layer1 = VLMActX.Layers(strLayer)
    Layer1.Laserable = bLaserable
    Layer1.Visible = bLaserable
End Function
```

1 ATTENTION:

Make sure that the semicolon <;> is used as separator between VMCSCRIPT and the function name (e.g.: DS;VMCSCRIPT;ActivateLayer "Layer2",true). Make sure that a space is between function and first parameter in the telegram. Make sure that parameters are separated by commas. Parameter transfers of strings have to be carried out in inverted commas.

4.3.7 DS Telegrams and types of Reply Telegrams

All fields containing <...> parameters may be customized. All fields containing <...> parameters are case sensitive. Parameters containing decimal places as DS;VB;SETQP;Standard;Current;12,3, are using the period or the comma as decimal separation mark depending on the country setting.

Executing script functions

Sender	Name	TelegramType	Keyword	Parameter 1	Parameter 2	Parameter 3
Calling a VMC_HK VB script function						
Host -> VMC_HK	DS	VMCScript	<Function>	Parameter	Parameter	Parameter
VMC_HK -> Host	Success:	QA				
	Failure:	QN				

Changing font types

Sender	Name	TelegramType	Keyword	Parameter 1	Parameter 2	Parameter 3
Replacing font types						
Host -> VMC_HK	DS	VB	Font	<MoName>	<FontName>	
VMC_HK -> Host	Success:	QA				
	Failure:	QN				

Laser power measurement:

Sender	Name	Telegram Type	Keyword	Parameter 1	Parameter 2	Parameter 3
Start of laser power measurement or regulation (depending on Power Configuration)						
Host -> VMC_HK	DS	Power	Measure			
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Request of the measured power in W (after a power measurement/-regulation cycle)						
Host -> VMC_HK	DS	Power	GetPow	Measured		
VMC_HK -> Host	Success:	QA;Power;<Value>				
	Failure:	QN				
Request of the actual power in W (without a power measurement/-regulation cycle before)						
Host -> VMC_HK	DS	Power	GetPow	Actual		
VMC_HK -> Host	Success:	QA;Power; <Value>				
	Failure:	QN				

Request of system times

Sender	Name	Telegram Type	Keyword	Parameter 1	Parameter 2	Parameter 3
Request of total diode time (only D-Line systems older than 2004)						
Host -> VMC_HK	DS	Laser	GetTime	DiodeTime		
VMC_HK -> Host	Success:	QA;DiodeTime;<Value>				
	Failure:	QN				
Request of total system time (only D-Line and E-Line systems)						
Host -> VMC_HK	DS	Laser	GetTime	SystemTime		
VMC_HK -> Host	Success:	QA;SystemTime;<Value>				
	Failure:	QN				

Laser parameters

Sender	Name	Telegram Type	Keyword	Parameter 1	Parameter 2	Parameter 3
Set current						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	Current	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read current						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	Current	
VMC_HK -> Host	Success:	QA;Current;<Value>				
	Failure:	QN				
Set frequency						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	Frequency	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read frequency						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	Frequency	
VMC_HK -> Host	Success:	QA;Frequency;<Value>				
	Failure:	QN				
Set speed						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	Speed	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read speed						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	Speed	
VMC_HK -> Host	Success:	QA;Speed;<Value>				
	Failure:	QN				
Set pulse step width						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	Step	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read pulse step width						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	Step	

VMC_HK -> Host	Success: QA; PulseStep;<Value> Failure: QN					
Set pulse limit						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	Limit	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read pulse limit						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	Limit	
VMC_HK -> Host	Success:	QA; PulseLimit;<Value>				
	Failure:	QN				
Set beam delay 'Beam on'						
Host -> VMC_HK	0DS	VB	SetQp	<QPName>	BDBeamOn	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read beam delay 'Beam on'						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	BDBeamOn	
VMC_HK -> Host	Success:	QA; GDBeamOn;<Value>				
	Failure:	QN				
Set beam delay 'Beam off'						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	BDBeamOff	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read beam delay 'Beam off'						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	BDBeamOff	
VMC_HK -> Host	Success:	QA; GDBeamOff;<Value>				
	Failure:	QN				
Set beam delay 'Corner'						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	BDCorner	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read beam delay 'Corner'						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	BDCorner	
VMC_HK -> Host	Success:	QA; GDCorner;<Value>				
	Failure:	QN				

Set galvo delay 'Jump time max.'						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	GDJumpMax	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read galvo delay 'Jump time max.'						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	GDJumpMax	
VMC_HK -> Host	Success:	QA; GDJumpMax;<Value>				
	Failure:	QN				
Set galvo delay 'Jump time min.'						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	GDJumpMin	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read galvo delay 'Jump time min.'						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	GDJumpMin	
VMC_HK -> Host	Success:	QA; GDJumpMin;<Value>				
	Failure:	QN				
Set galvo delay 'Saturation'						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	GDSatur	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read galvo delay 'Saturation'						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	GDSatur	
VMC_HK -> Host	Success:	QA; GDSatur;<Value>				
	Failure:	QN				
Switch mode aperture						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	Aperture	<Value> ("Small" or "Large")
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Read mode aperture						
Host -> VMC_HK	DS	VB	GetQp	<QPName>	Aperture	
VMC_HK -> Host	Success:	QA; Aperture;<Small> oder <Large>				
	Failure:	QN				

Set power (for special laser types with RCU software)						
Host -> VMC_HK	DS	VB	SetQp	<QPName>	Power	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				

Drift compensation

Sender	Name	Telegram Type	Keyword	Parameter 1	Parameter 2	Parameter 3
Enable offset drift measurement						
Host -> VMC_HK	DS	Vision	MeasDrift	OffsetDrift		
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Query offset drift values						
Host -> VMC_HK	DS	Vision	GetDrift	OffsetDrift		
VMC_HK -> Host	Success:	QA; OffsetDrift;<ValueX1;ValueY1>				
	Failure:	QN				

Switch on/off the laser and the beam

Sender	Name	Telegram Type	Keyword	Parameter 1	Parameter 2	Parameter 3
Switch on/off laser						
Host -> VMC_HK	DS	Laser	SetStatus	LaserActive	<On> or <Off>	
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Query laser status ON/OFF						
Host -> VMC_HK	DS	Laser	GetStatus	LaserActive		
VMC_HK -> Host	Success:	QA; LaserActive;<On> or <Off> or <Error>				
	Failure:	QN				
Query laser status						
Host -> VMC_HK	DS	Laser	GetStatus	LaserStatus		

VMC_HK -> Host	Success:	QA;LaserStatus;<*>									
	*										
	<1>	Startup									
	<2>	Ready									
	<3>	Operation									
	<4>	Error									
	<5>	Precooling									
	<6>	Ignition									
	<7>	Warmup									
	<8>	Postcooling									
	<9>	Programming									
	<10>	Warning									
	<11>	Shutdown									
	<12>	SwitchOnDiodes									
	<13>	Configuration									
	Failure:	QN									
<hr/>											
Switch beam on/off											
Host -> VMC_HK	DS	Laser	SetStatus	BeamActive	<On> or <Off>						
VMC_HK -> Host	Success:	QA									
	Failure:	QN									
<hr/>											
Query beam status											
Host -> VMC_HK	DS	Laser	GetStatus	BeamActive							
VMC_HK -> Host	Success:	QA;BeamActive;<On> or <Off> or <Error>									
	Failure:	QN									
<hr/>											
Open and close the shutter											
Host -> VMC_HK	DS	Laser	SetStatus	Shutter	<Open> or <Close>						
VMC_HK -> Host	Success:	QA									
	Failure:	QN									
<hr/>											
Query shutter status											
Host -> VMC_HK	DS	Laser	GetStatus	Shutter							
VMC_HK -> Host	Success:	QA;Shutter;<Open> or <Close> or <Error>									
	Failure:	QN									
<hr/>											

Set and get attributes for RCU systems

Sender	Name	Telegram Type	Keyword	Parameter 1	Parameter 2	Parameter 3

Changing attributes in RCU systems						
Host -> VMC_HK	DS	System	SetAttribute	<ComponentName>	<AttributeName>	<Value>
VMC_HK -> Host	Success:	QA				
	Failure:	QN				
Query attributes in RCU systems						
Host -> VMC_HK	DS	System	GetAttribute	<ComponentName>	<AttributeName>	
VMC_HK -> Host	Success:	QA;<AttributeName>;<Value>				
	Failure:	QN				

4.3.8 AU telegram (interrupt job)

With this telegram a job loaded can be interrupted.

Command code —————

Byte 1	AU
Byte 2	

 ————— interrupt job

In this telegram no job name is specified. It is always the current job that is interrupted.

4.3.9 The AL telegram (delete job)

With this telegram you can delete a job. The specification of the job name is necessary. The section length for the job name is variable. In this example a job name with 20 characters was chosen. The section for the job name may not be filled with zero characters at the end.

Command code —————

Byte 1 Byte 2	AL
Byte 3 ... Byte 22	xx

 ————— Delete job
 User data ————— name of the job

4.3.10 BS telegram (start marking)

Marking will be executed once with the BS telegram. The marker replies with the BE telegram (end of marking) after the marking process has been completed. If the number of pieces indicated in the job has been reached, the job will be terminated and an AE telegram will additionally be sent to the host. No data will be transferred with the BS telegram. In case of failure of the marking, a QN telegram is sent back instead of the BE telegram.



4.4 Reply telegrams from the laser marker to the host

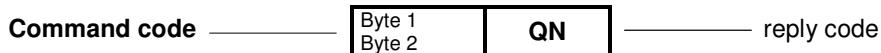
4.4.1 QA Telegram (positive response)

QA: Acknowledgement (data transferred) for the telegrams DA, DR, DT, DC.



4.4.2 QN Telegram (negative response)

QA: Negative acknowledgement (data incorrect) for the telegrams DA, DR, DT, DC, AS, AU, AL, BS.



4.4.3 BE Telegram (End of Marking)

BE: acknowledgement (marking done) following the telegram BS.



4.4.4 AE Telegram (End of Job)

AE: acknowledgement (end of job) following the telegram AS and the execution of the marking with the number of pieces stipulated. It is possible to determine in the setup of the program whether a BE is sent in advance or not.



4.5 Unicode in telegrams

With the VMC_HK it is possible to receive and send Unicode data and to process them. There are five possibilities to transmit data.

- ⇒ **ASCII:** As until now all telegrams can be transmitted without Unicode.
- ⇒ **UTF8:** The whole telegram is sent as UTF8 string. This coding is denoted by the prefixed identifier <0xEF><0xBB><0xBF>. For a detailed description about the UTF 8 coding refer to: <http://www.cl.cam.ac.uk/~mgk25/unicode.html>.
- ⇒ **UTF-16BE:** Each character in the telegram is displayed with 2 bytes. With UTF-16BE the highbyte is sent first and the lowbyte afterwards. The UTF-16BE's identifier is <0xFE><0xFF>. Example:
<0xFE><0xFF><0>D<0>T<0>V<0>a<0>l<0>u<0>e<0>1<0><tab><0>V<0>a<0>l<0>u<0>e<0>2
- ⇒ **UTF-16LE:** Each character in the telegram is displayed with 2 bytes. With UTF-16LE the lowbyte is sent first and the highbyte afterwards. The UTF-16LE's identifier is <0xFF><0xFE>. Example:
<0xFF><0xFE>D<0>T<0>V<0>a<0>l<0>u<0>e<0>1<0><tab><0>V<0>a<0>l<0>u<0>e<0>2<0>
- ⇒ **"Mixed Mode:** Only variables are sent with Unicode, namely with the UTF-16LE coding. This mode supports both, sending the variables as Unicode and as ASCII. Variables which are sent as Unicode begin and end with <0xFF><0xFE>. Examples:
Only Unicode:
DT<0xFF><0xFE>V<0>a<0>l<0>u<0>e<0>1<0><0xFF><0xFE><tab><0xFF><0xFE>V<0>a<0>l<0>u<0>e<0>2<0><0xFF><0xFE>
Mixed:
DTValue1<tab><0xFF><0xFE>V<0>a<0>l<0>u<0>e<0>2<0><0xFF><0xFE>

5 Application Examples for the Job Telegrams DA, DC, DT and DS

This section shows various examples in order to facilitate the application of the DC, DA and DT telegrams.

5.1 Example of a DA telegram (job with data and a stipulated number of pieces)

5.1.1 Telegram Sequence

Data structure

Name of the job:	JOB1
VLM file name:	Part_007
Names of variable data:	Number of the parts, date, day of prod., text Text ...
Quantity:	15

I. Sending the job JOB1 and the data with the telegram DA:

Command code	Byte 1 Byte 2	DA	job telegram
User data	Byte 3 ... Byte 22	JOB1*****	name of the job
	Byte 23 ... Byte 28	15***	number of pieces
	Byte 29 Byte 30	**	number of drawings
	Byte 31 ... Byte 50	Part_007*****	VLM file
	Byte 51 ... Byte 56	0.0***	X offset
	Byte 57 ... Byte 62	0.0***	Y offset
	Byte 63 ... Byte 68	0.0***	α -Offset
	Byte 69 ... Byte 74	*****	scaling X
	Byte 75 ... Byte 80	*****	scaling Y
	Byte 81 ... Byte 109	Number of the parts <TAB> date <TAB> day of prod. <TAB> TEXT <CRLF>	variable data
	Byte 109.. Byte 151	N5925783 <TAB> 06.05.1999 <TAB> 12.07.1999<TAB>DESCRIPTION <CRLF>	

* character represents hex 0

The job is shown. The laser marker replies with the acknowledgement telegram QA. The <CRLF> at the end is not necessary for TCP/IP connections.

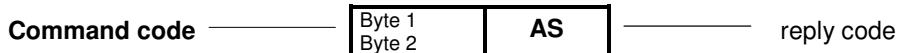


If the job cannot be accepted by the laser marker, a negative acknowledgement will follow.



II. Starting a job with the AS telegram

The job sent will be activated and can be executed.



The laser marker replies with the telegram:



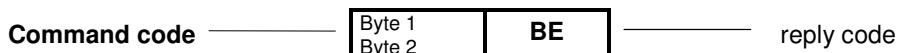
If there is no job which can be executed, the laser marker replies with the QN telegram:



III. Executing the marking with the telegram BS



After the workpiece has been marked, the remaining number of pieces will decrease by 1. After the marking has been completed the laser marker replies -if defined in the options dialog- with the BE telegram.



After the job has been executed as often as indicated by the piececount, the laser marker will send the AE telegram:



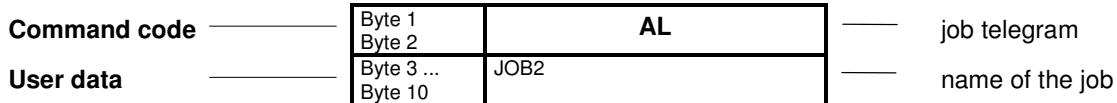
IV. Interrupting the job loaded:



The marking system reports the interruption with an acknowledgement telegram:



V. Deleting the job:



The second job can be removed with the AL telegram. After the job has been deleted, the laser marker will reply with the telegram:

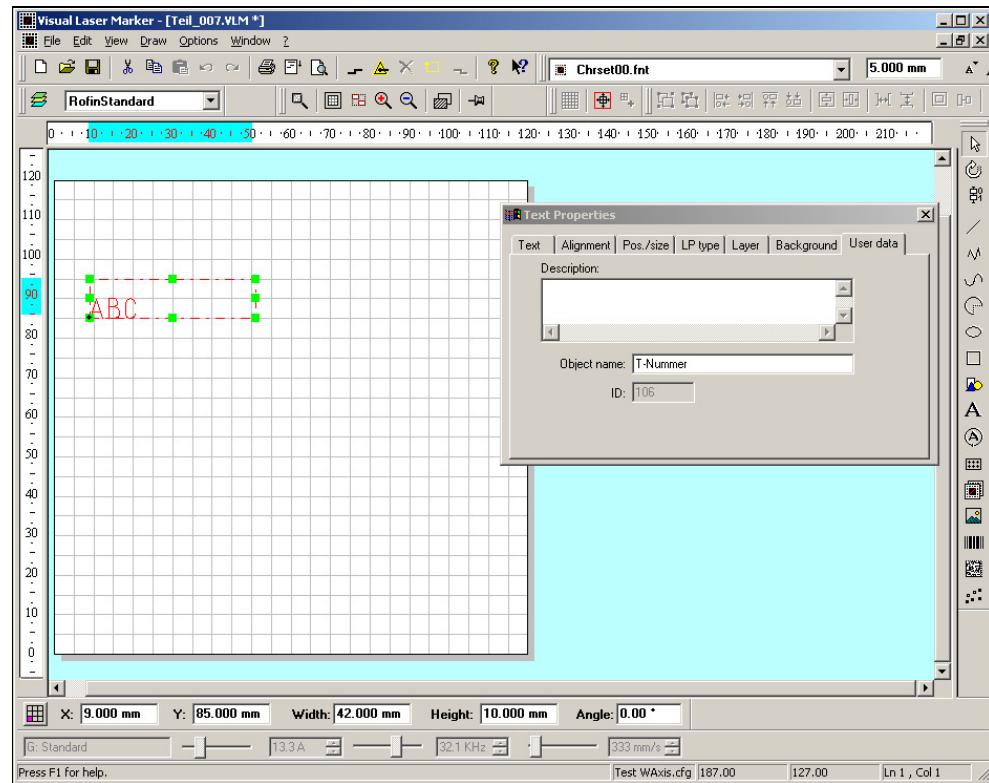


If the job is resident and cannot be removed, the laser marker replies with the telegram:

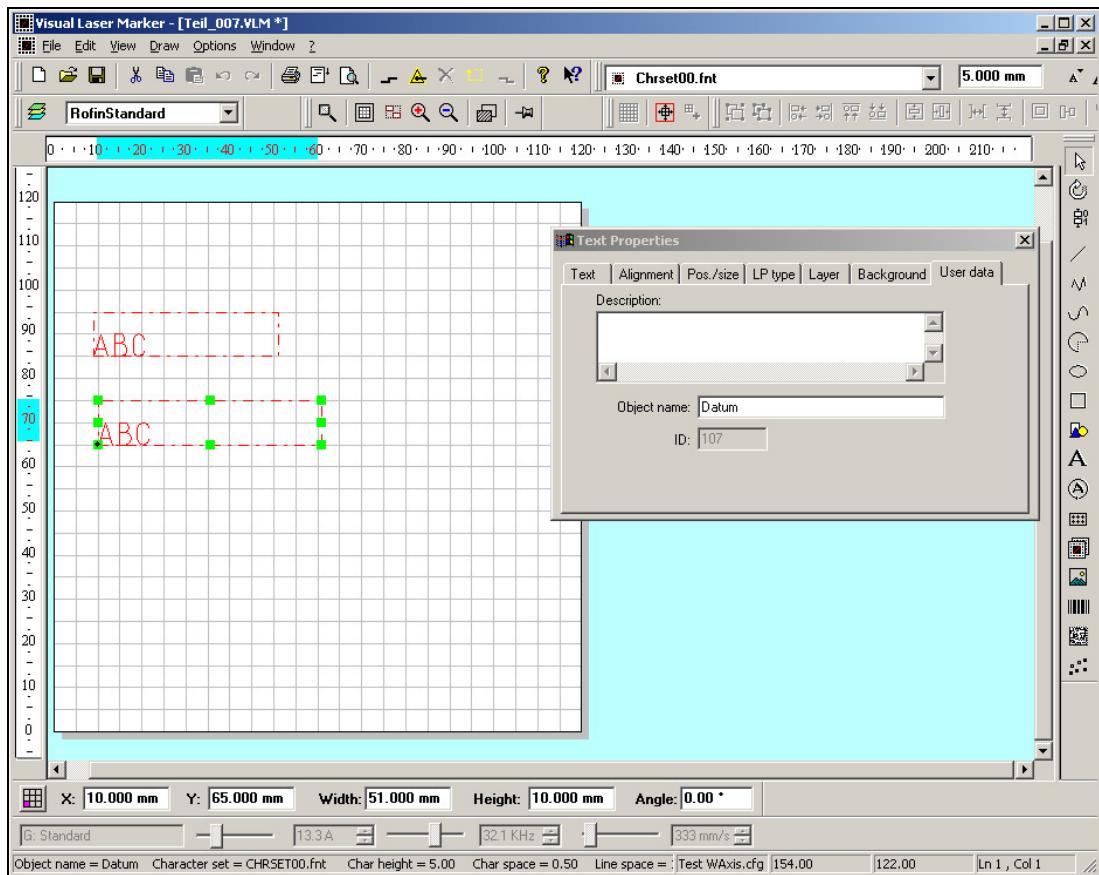


5.1.2 Creating the required VLM drawing

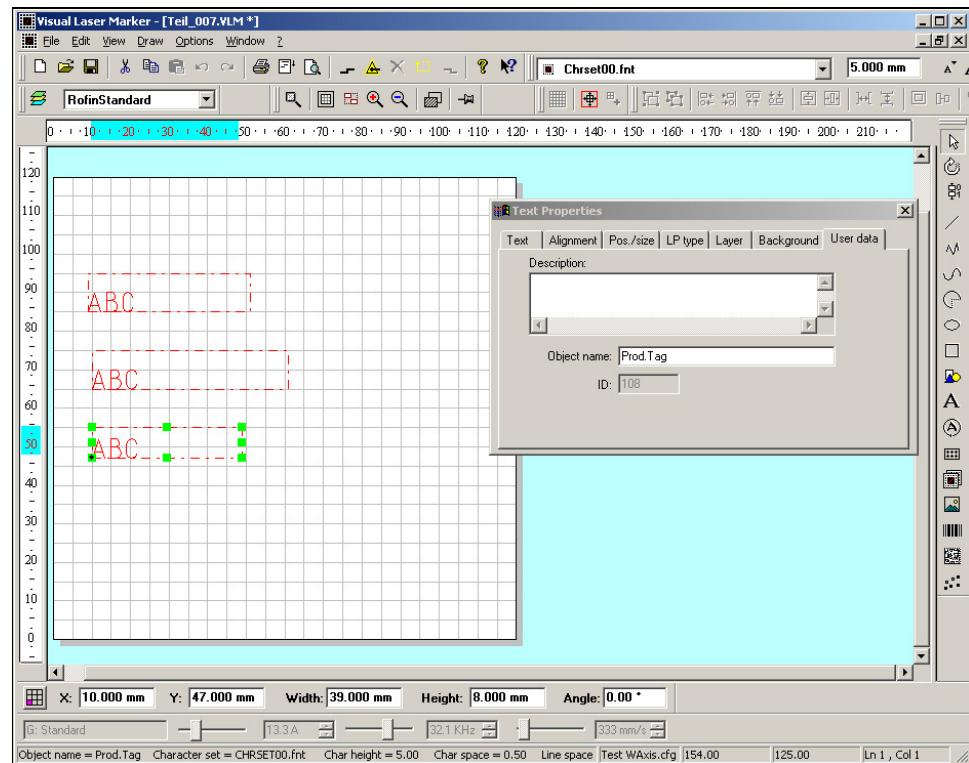
Creating the text object "T number"



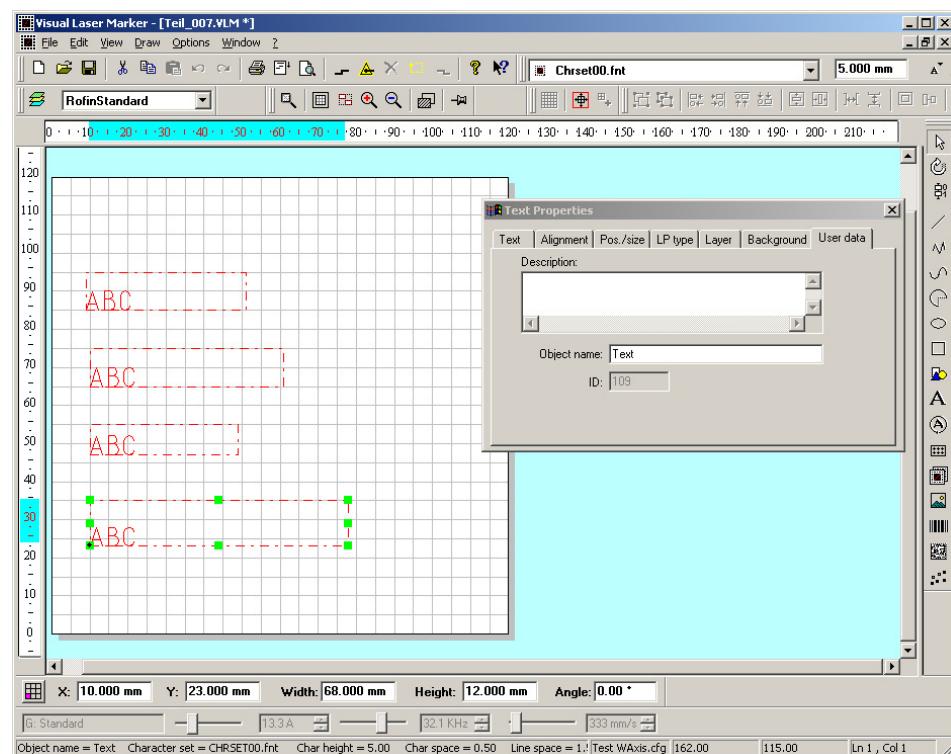
Creating the text object "Date"



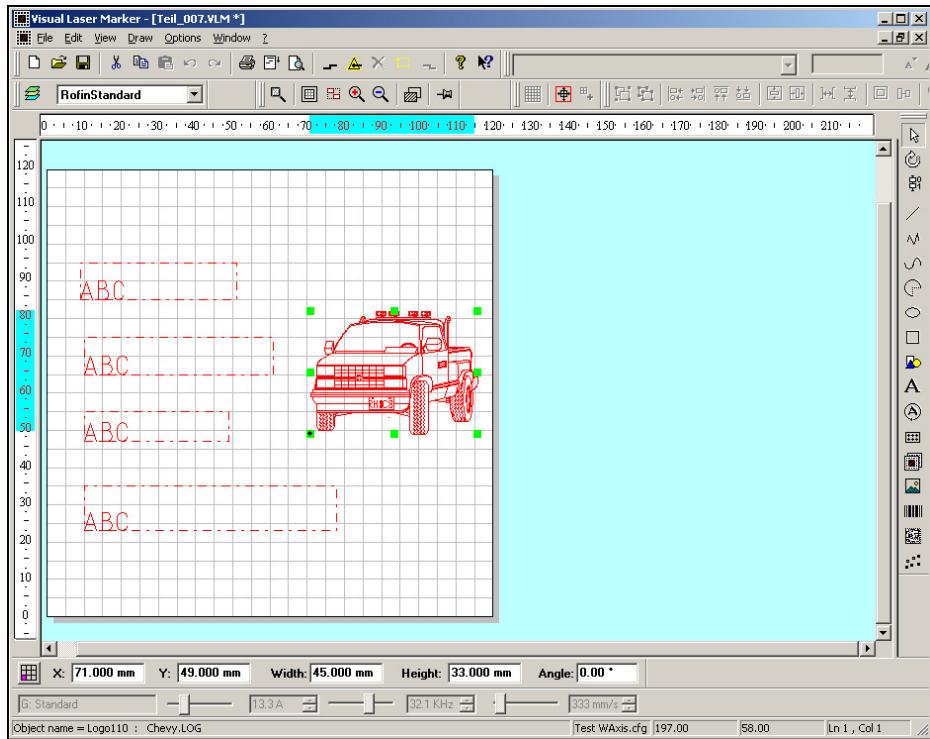
Creating the text object "Day of prod."



Creating the text object "Text"



Inserting marking objects, without any modifications by the host coupling

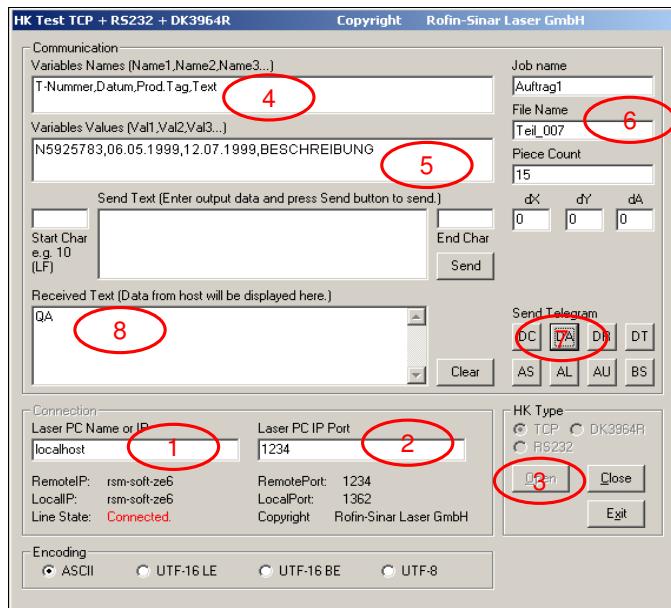


When the drawing is completed it will be saved with the file name "Part_007.VLM".

5.1.3 Sending Telegrams from HK_Test to VMC_HK

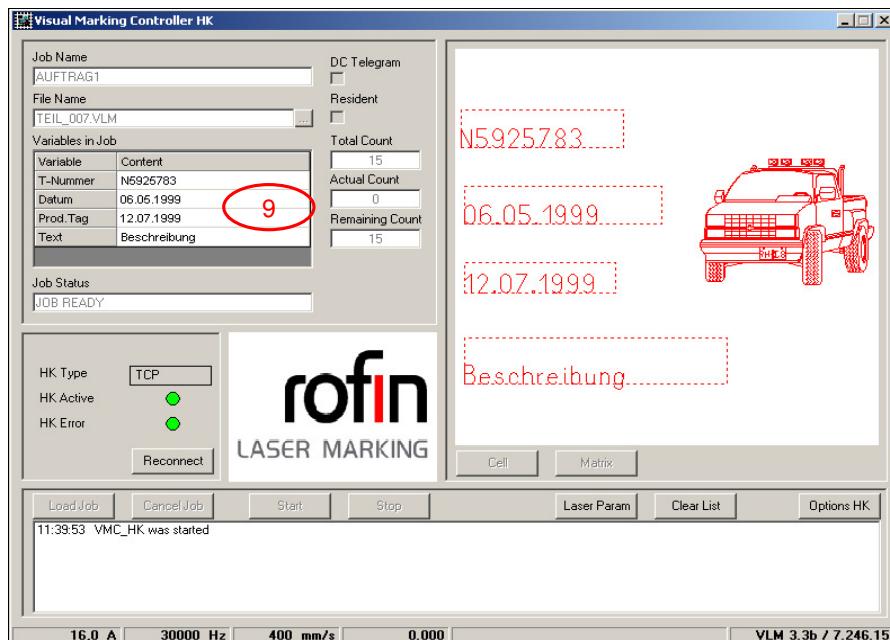
For information on the HK_Test Tool please refer to section 3.7. In this example a local TCP/IP connection with the IP "localhost", is started in one PC.

Sending the DA telegram with HK test



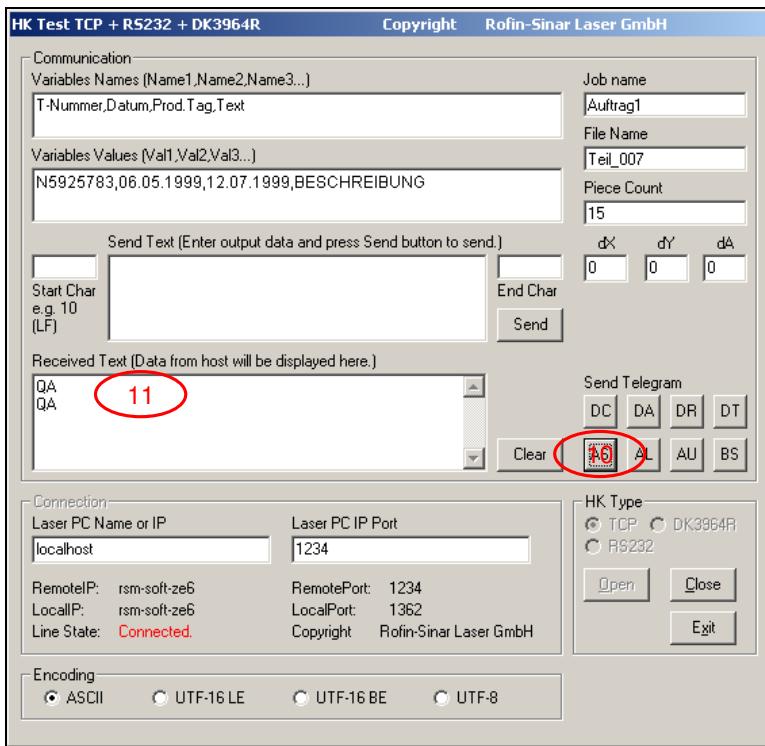
For testing the example, the HK_test tool has to be set as shown above. The DA telegram is sent to the VMC_HK by pressing the [DA] button.

Successful operation of the DA telegram



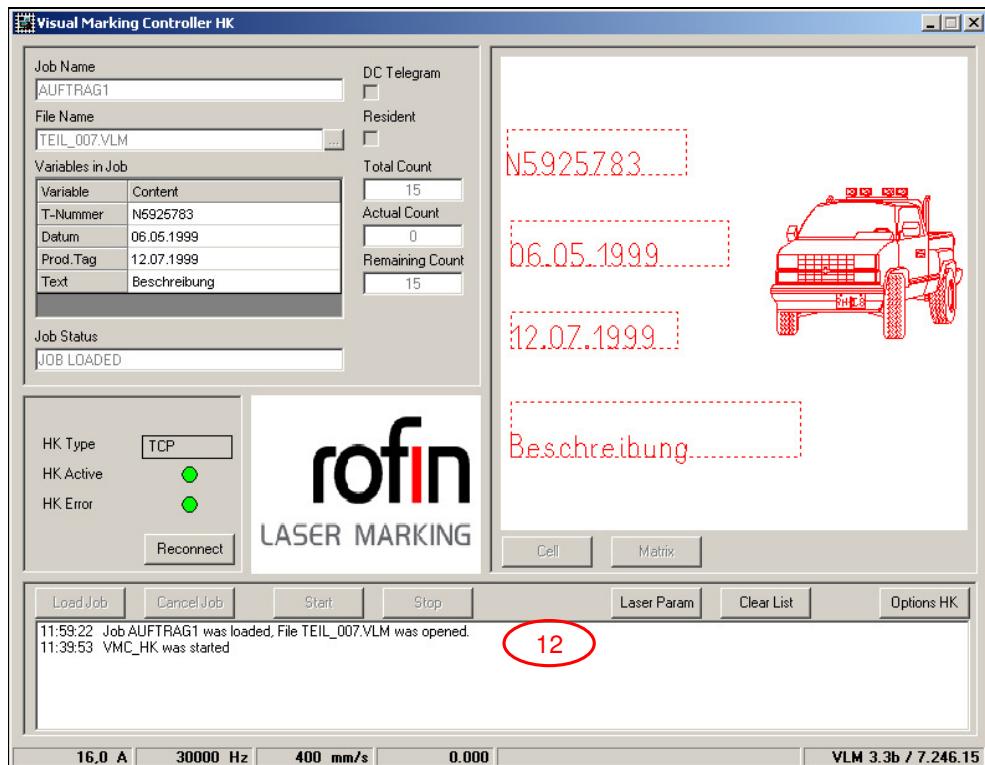
The VMC_HK replies in the example above with a QA telegram to HK_Test. If an error had occurred, the VMC_HK would have returned a QN to the HK_Test Tool.

Sending the AS telegram

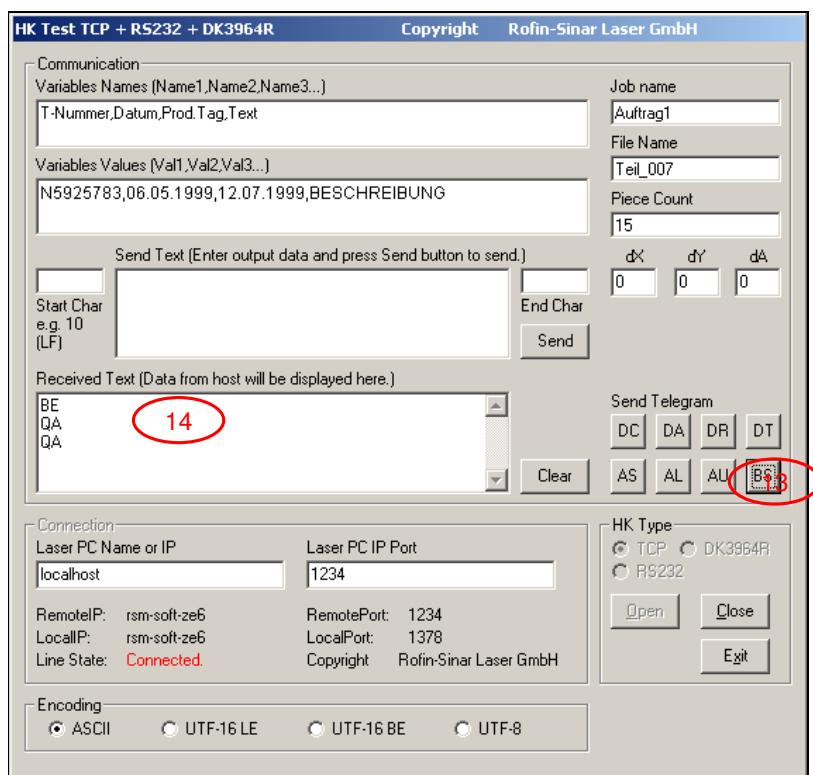


The DA telegram is sent to the VMC_HK by pressing the [AS] button.

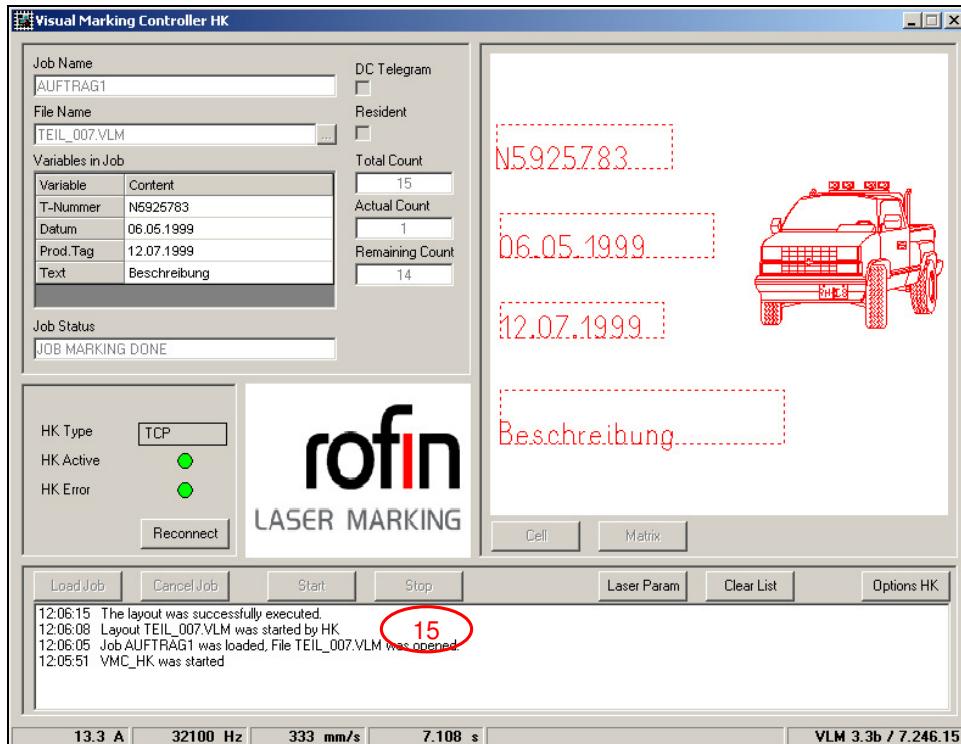
Executing the AS telegram



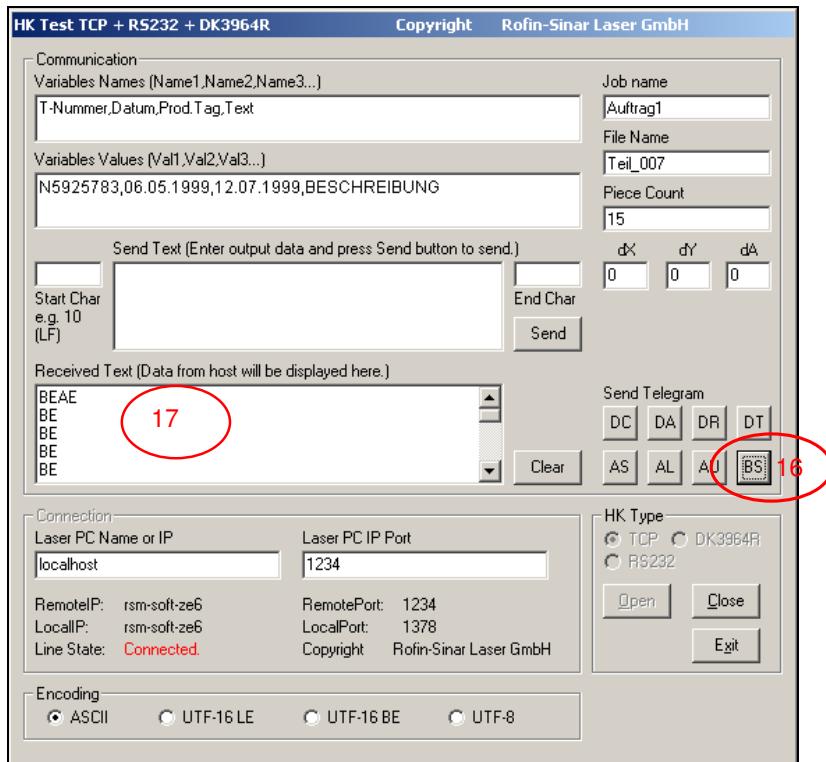
Starting the marking by using the BS telegram



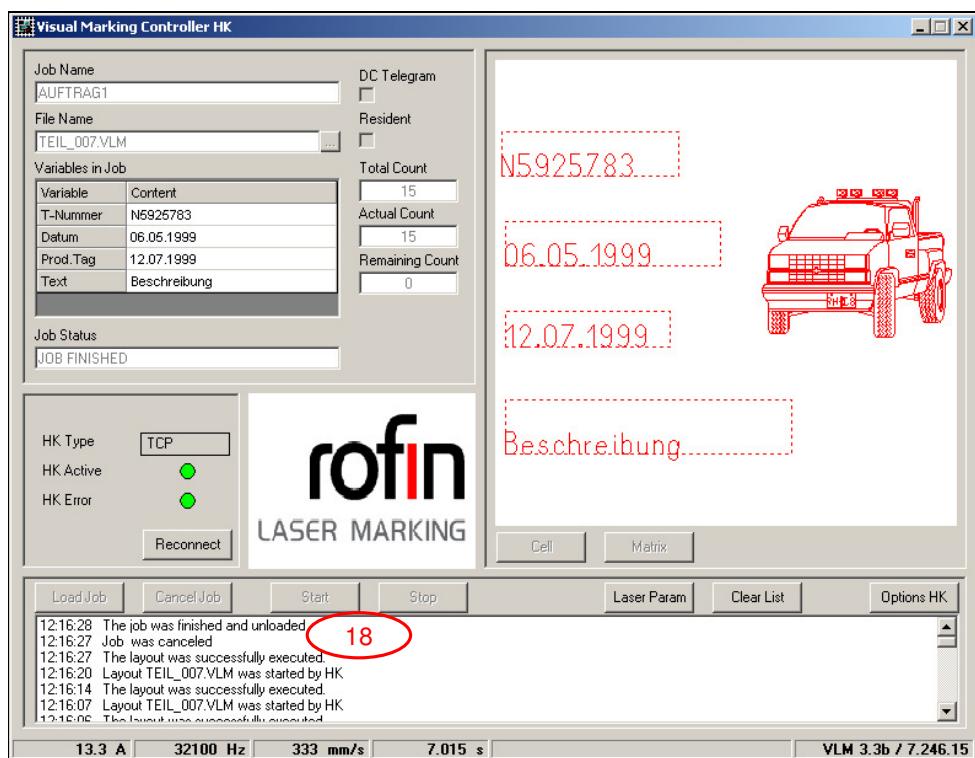
Executing the first marking



Reply telegrams BE and AE after the last marking process



End of job



5.2 Example of DA telegram + DT telegram

(Job without a stipulated number of pieces and changing variable data)

5.2.1 Telegram Sequence

Data structure:

Name of the job:	JOB2
VLM file name:	Part_007
Names of variable data:	Number of the parts, date, day of prod., text ...

I. Sending the job JOB2 with the telegram DA:

Command code	Byte 1 Byte 2	DA	job telegram
	Byte 3 ... Byte 22	JOB2*****	name of the job
	Byte 23	0*****	number of pieces
	...		
	Byte 28		
	Byte 29 Byte 30	**	number of drawings
	Byte 31	Part_007*****	VLM file
	...		
	Byte 50		
User data	Byte 51	*****0,0***	X offset
	...		
	Byte 56		
	Byte 57	*****0,0***	Y offset
	...		
	Byte 62		
	Byte 63	*****0,0***	α -Offset
	...		
	Byte 68		
	Byte 69	*****	scaling X
	...		
	Byte 74		
	Byte 75	*****	scaling Y
	...		
	Byte 80		
	Byte 81	Number of the parts <TAB> date <TAB> day of prod. <TAB> TEXT <CRLF>	variable data
	...		
	Byte 109		
	Byte 109.. Byte 151	0 <TAB>0 <TAB> 0<TAB>0 <CRLF>	

* character represents hex 0

The job will be entered in the pile and the marking system replies with the acknowledgement telegram:

Command code	Byte 1 Byte 2	QA	reply code
---------------------	------------------	----	------------

The variable data will be initialised with the data transferred (default values). If the job cannot be accepted by the laser marker, a negative acknowledgement will follow:

Command code	Byte 1 Byte 2	QN	reply code
---------------------	------------------	----	------------

A negative acknowledgement can be triggered if e.g. the VLM file indicated does not exist or if the variable data declarations do not agree with the command code.

II. Starting a job with the telegram AS:

The indicated job "JOB2" will be activated and can be executed:

Command code	Byte 1 Byte 2	AS	job telegram
User data	Byte 3 ... Byte 22	JOB2*****	name of the job

The length of the job name may not exceed 20 characters. If the job name is shorter than 20 characters, the remaining characters have to be filled up with hex 0.

The laser marker replies with the telegram:

Command code	Byte 1 Byte 2	QA	reply code
--------------	------------------	----	------------

If there is no job which can be executed or if a job is already loaded, the laser marker will reply with the telegram:

Command code	Byte 1 Byte 2	QN	reply code
--------------	------------------	----	------------

III. Transferring data with the telegram DT:

Transferring variable data for the marking.

Command code	Byte 1 Byte 2	DT	job telegram
User data	Byte 3 ... Byte 26	N1234567 <TAB> 18.09.2003 <TAB> 15.09.2003<TAB>NEW DATA <CRLF>	variable data

If the data are accepted, the laser marker will reply with the telegram:

Command code	Byte 1 Byte 2	QA	reply code
--------------	------------------	----	------------

If the data cannot be accepted, the laser marker will reply with the telegram:

Command code	Byte 1 Byte 2	QN	reply code
--------------	------------------	----	------------

IV. Executing the marking with the telegram BS:

Command code —————

	Byte 1	Byte 2
	BS	

 ————— reply code

A workpiece will be marked with the data last transferred. After the marking has been completed, the laser marker replies with the telegram:

Command code —————

	Byte 1	Byte 2
	BE	

 ————— reply code

The piece number will be increased by 1 in the display window of the job editor (piececount unlimited).

For all further markings, new jobs have to be transferred with the DT telegram (see point III). Marking will be triggered with the BS telegram.

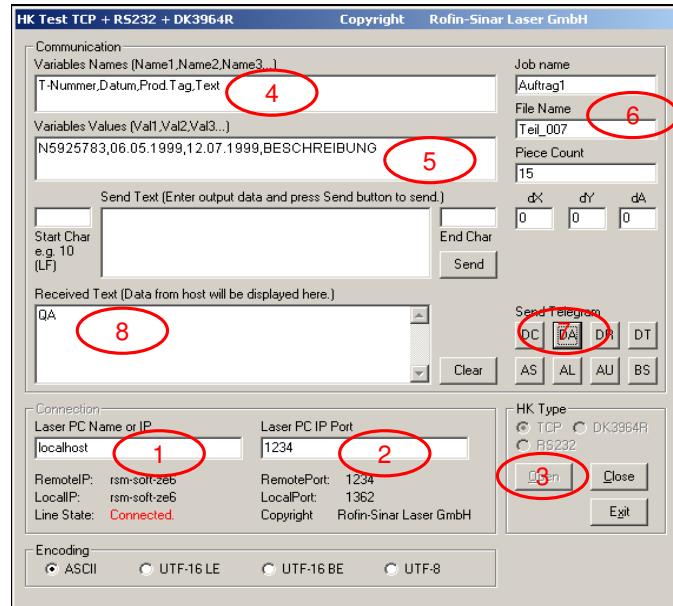
5.2.2 Creating the required VLM drawing

» *Section 4.1 "Creating the required VLM drawing"*

5.2.3 Sending Telegrams from HK_Test to VMC_HK

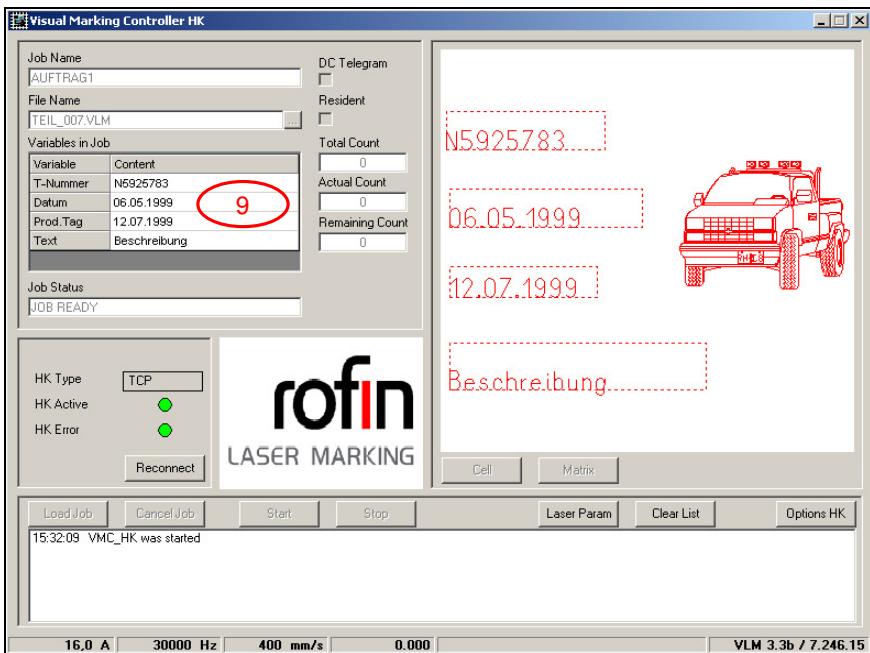
For information on the HK_Test Tool please refer to section 3.7. In this example a local TCP/IP connection with the IP "localhost", is started in one PC.

Sending the DA telegram with HK test



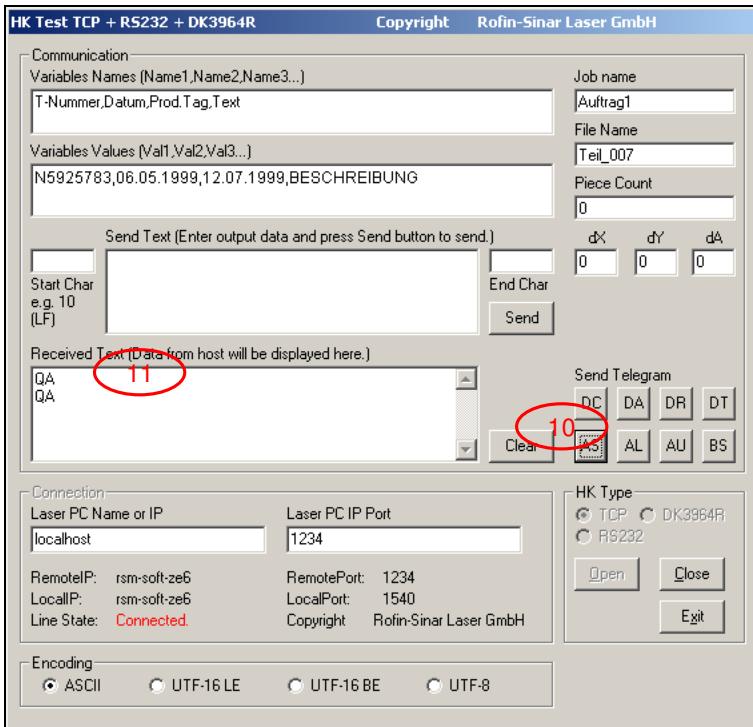
For testing the example, the HK_test tool has to be set as shown above. The DA telegram is sent to the VMC_HK by pressing the [DA] button.

Successful operation of the DA telegram



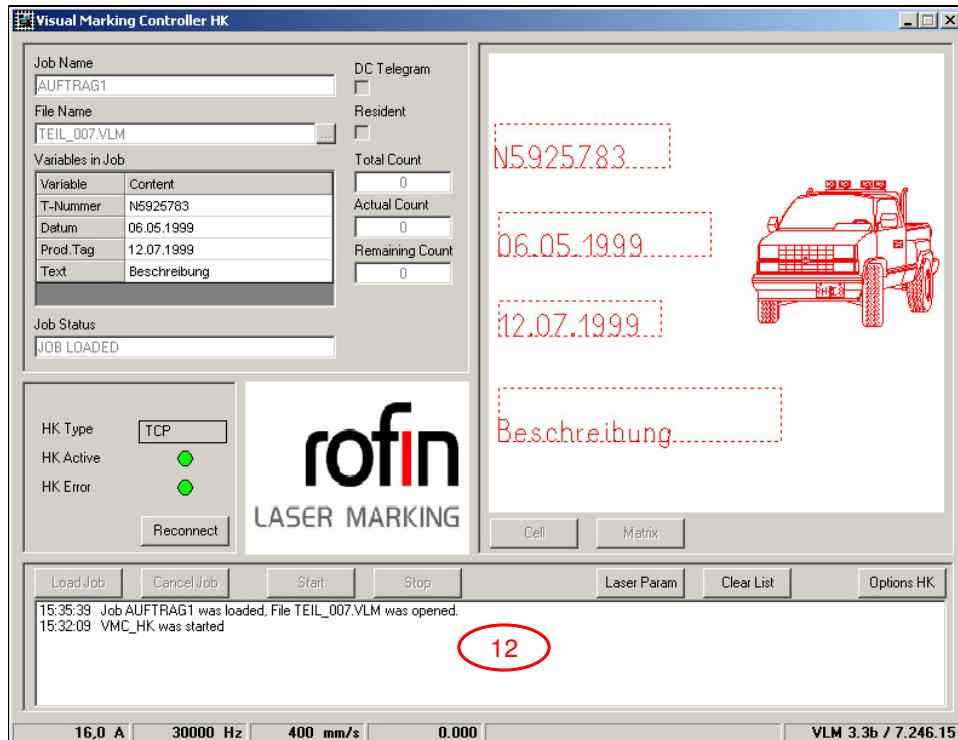
The VMC_HK replies in the example above with a QA telegram to HK_Test. If an error had occurred, the VMC_HK would have returned a QN to the HK_Test Tool.

Sending the AS telegram

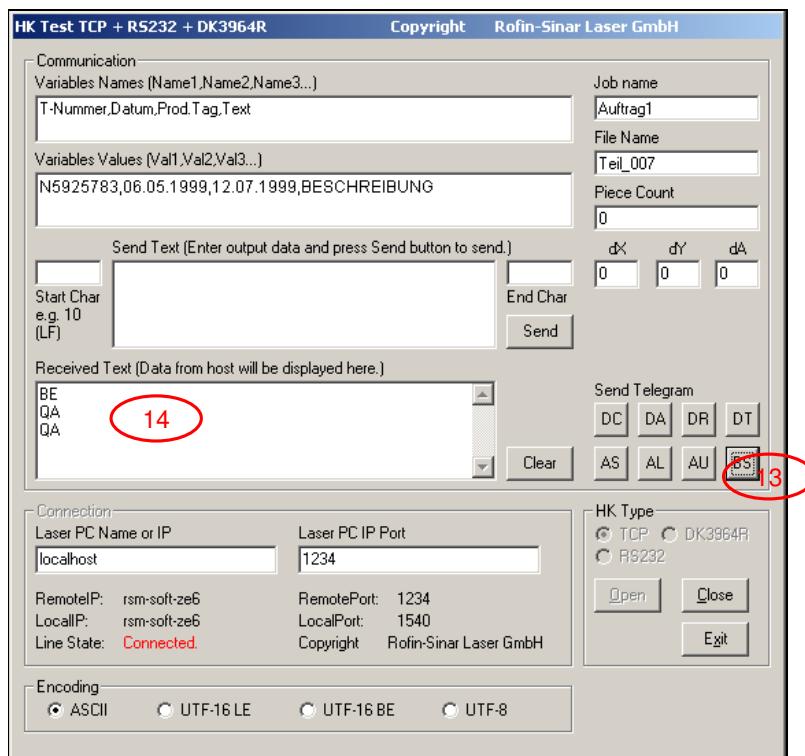


The DA telegram is sent to the VMC_HK by pressing the [AS] button.

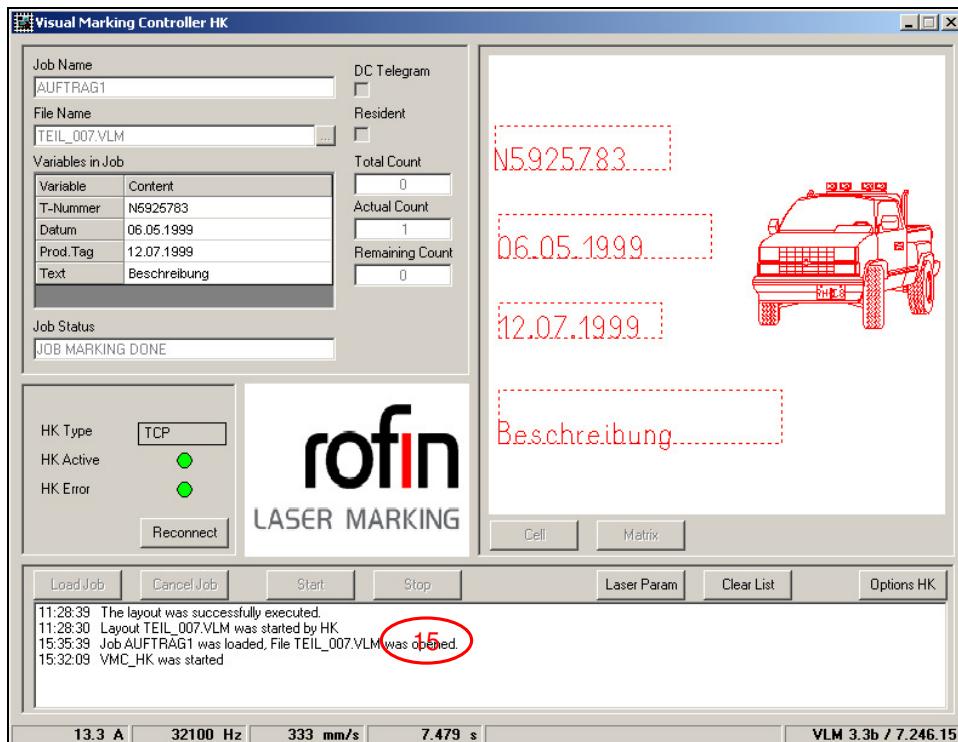
Executing the AS telegram



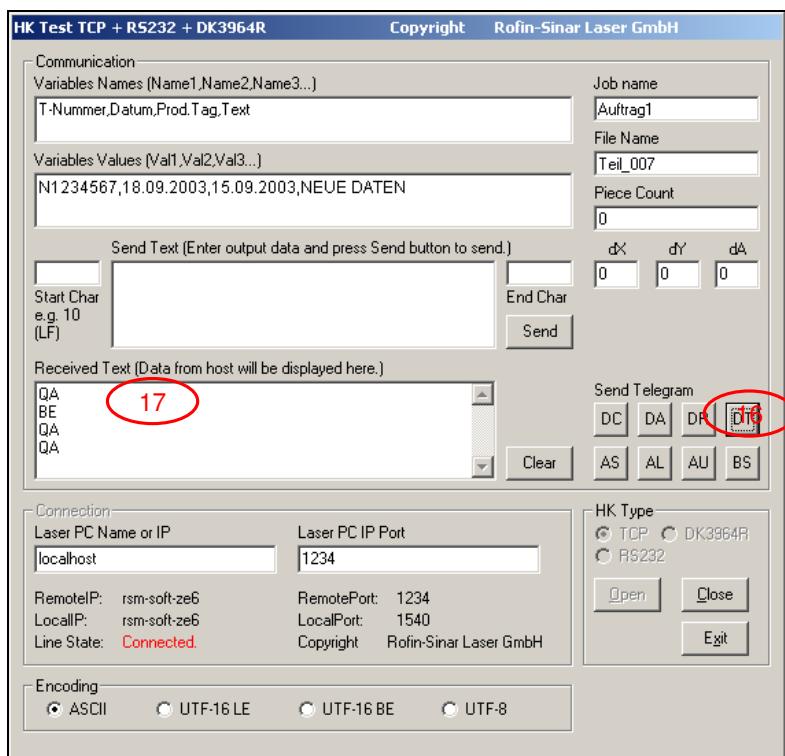
Starting the marking by using the BS telegram



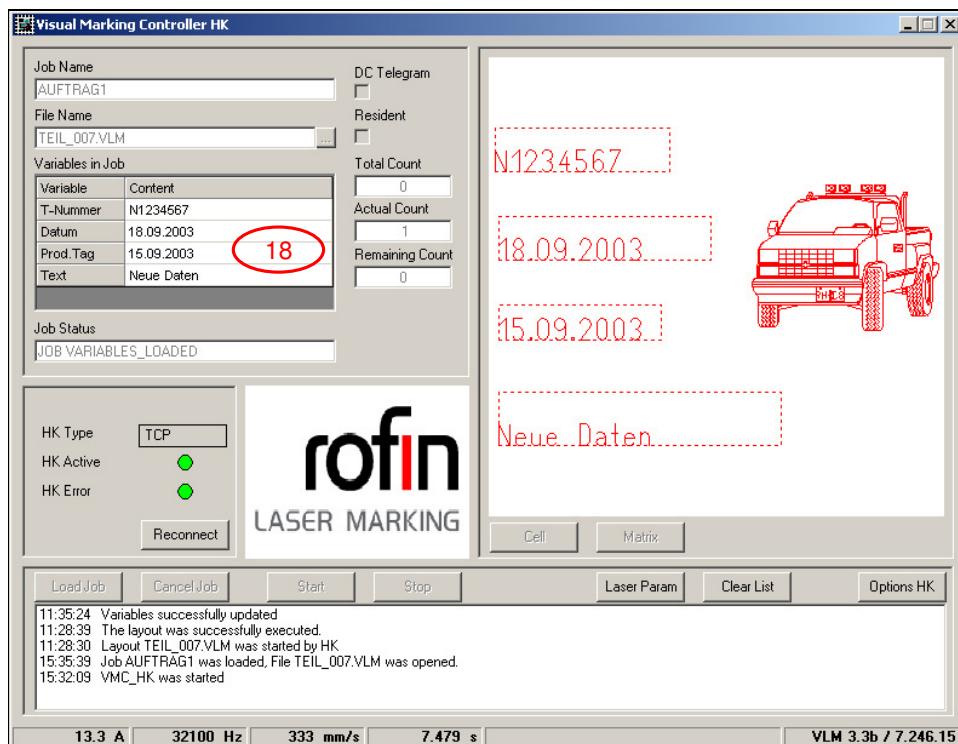
Executing the first marking



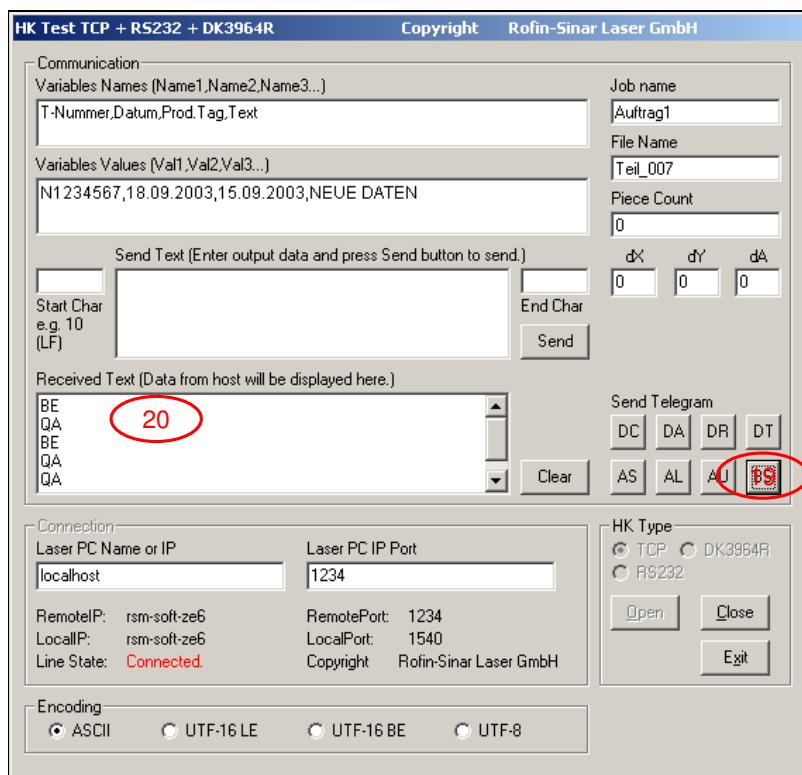
Modifying the content of variables by using the DT telegram



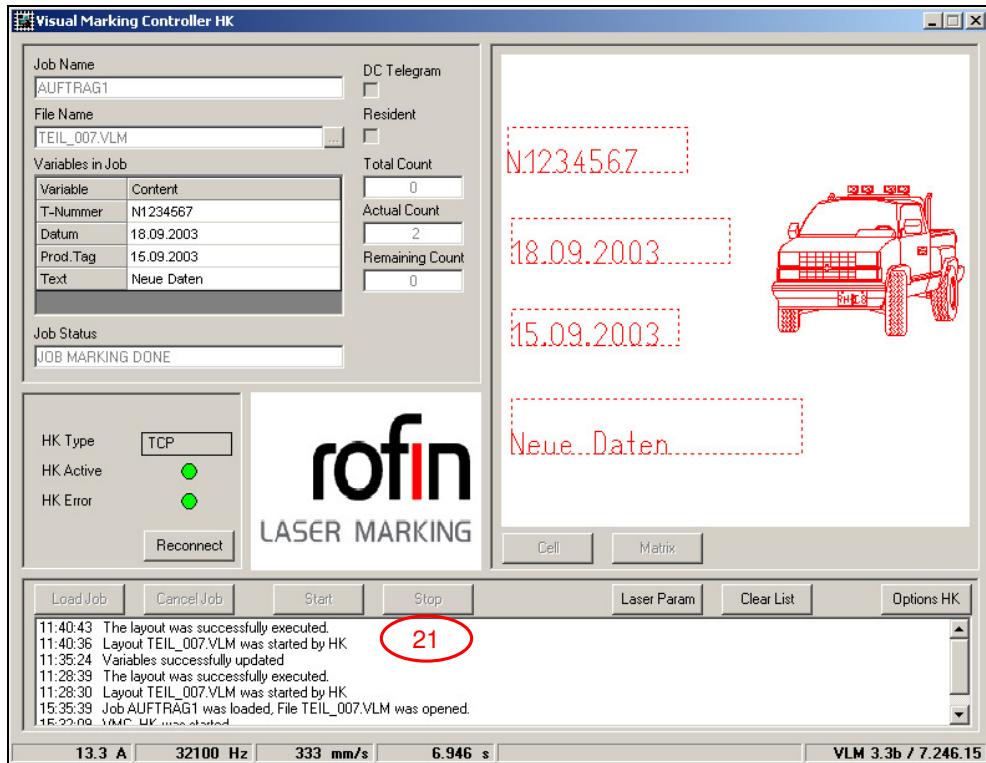
New contents of variables in the drawing



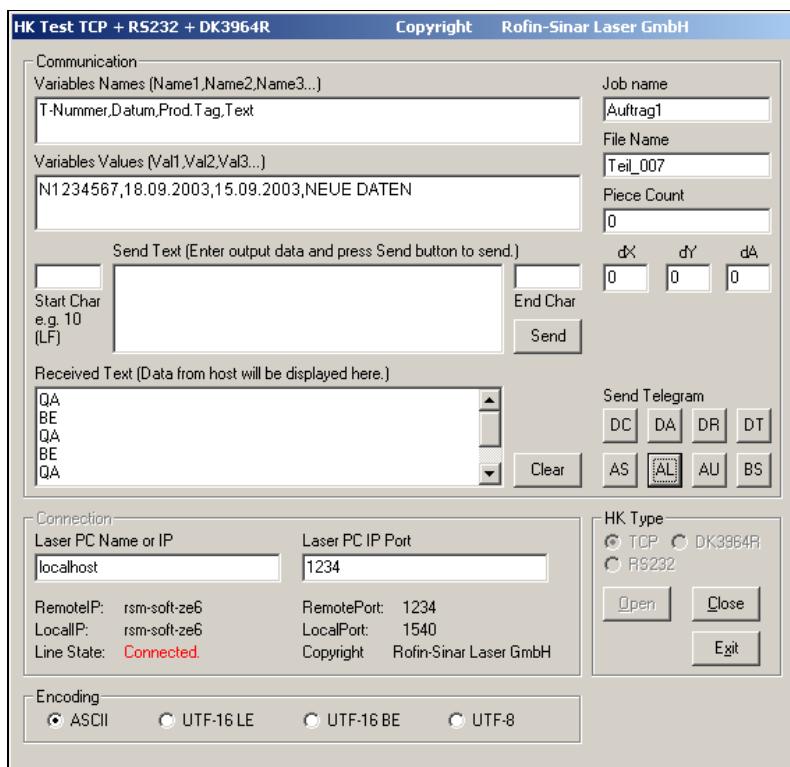
Starting the marking by using the BS telegram



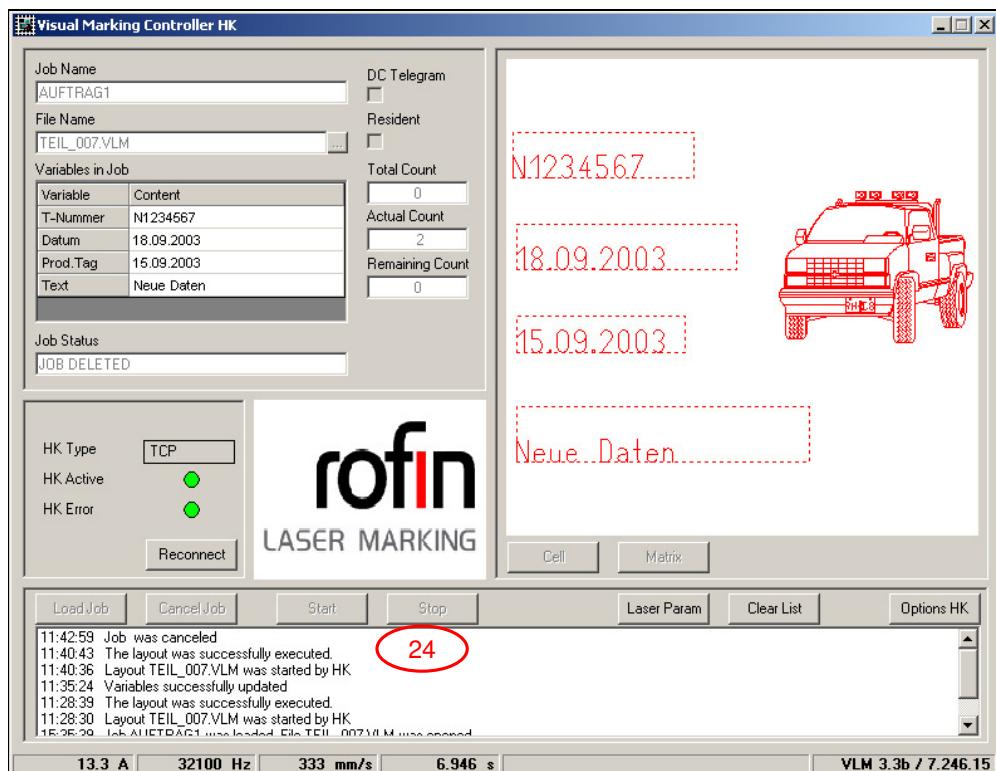
Executing the first marking



Exiting the job by using the AL telegram



Finished job



5.3 Example of a DC job with four fields of variables

5.3.1 Telegram Sequence

I. Sending the job with the telegram DC

Command code	Byte 1 Byte 2	DC	job telegram
User data	Byte 3 ... Byte 19	Part_007*****	VLM file (part_007.VLM)
	Byte 20 ... Byte 30	N5925783***	DC field 1
	Byte 30 ... Byte 39	06.05.1999	DC field 2
	Byte 40 ... Byte 51	12.07.1999	DC field 3
	Byte 52 ... Byte 79	DESCRIPTION*****	DC field 4

The job and the texts of the variables are shown. The job will automatically be loaded. If the name of the VLM file does not change, the job will be preserved.

The laser marker replies with the acknowledgement telegram:

Command code	Byte 1 Byte 2	QA	reply code
--------------	------------------	----	------------

If the job could not be loaded, the laser marker will reply with the telegram:

Command code	Byte 1 Byte 2	QN	reply code
--------------	------------------	----	------------

II. Starting the marking with the telegram BS

Command code	Byte 1 Byte 2	BS	reply code
--------------	------------------	----	------------

After the workpiece has been marked, the laser marker replies with the acknowledgement telegram:

Command code	Byte 1 Byte 2	BE	reply code
--------------	------------------	----	------------

A BE telegram will only be sent, if this option is set in the VMC_HKs options under "Reply to Host" (» section 2.1 "The Options dialog" / General).

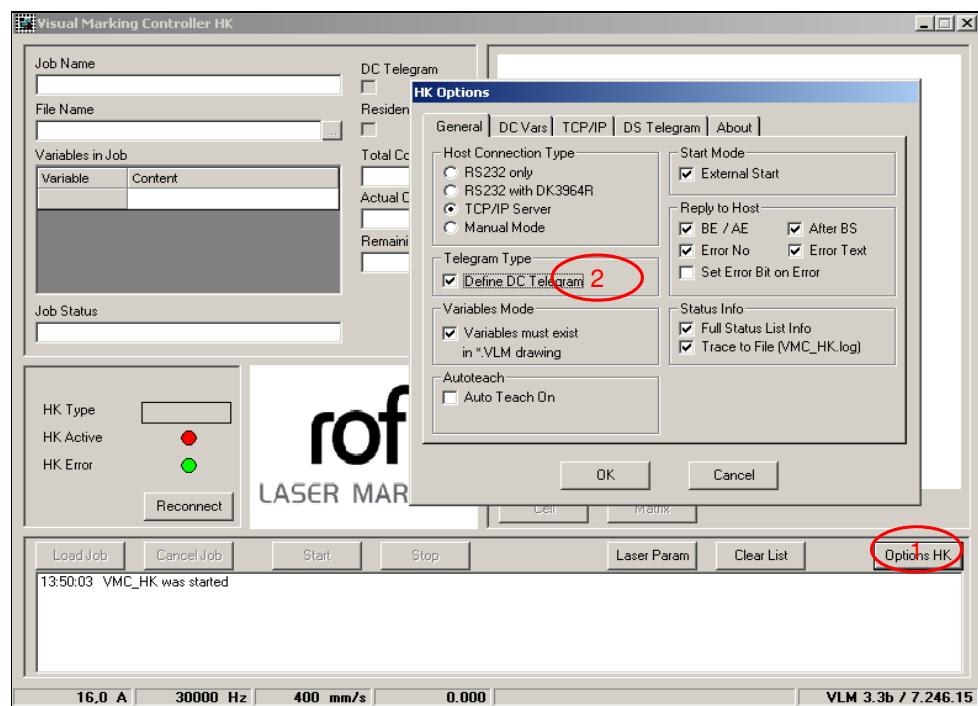
5.3.2 Creating the required VLM drawing

» Section "Creating the required VLM drawing".

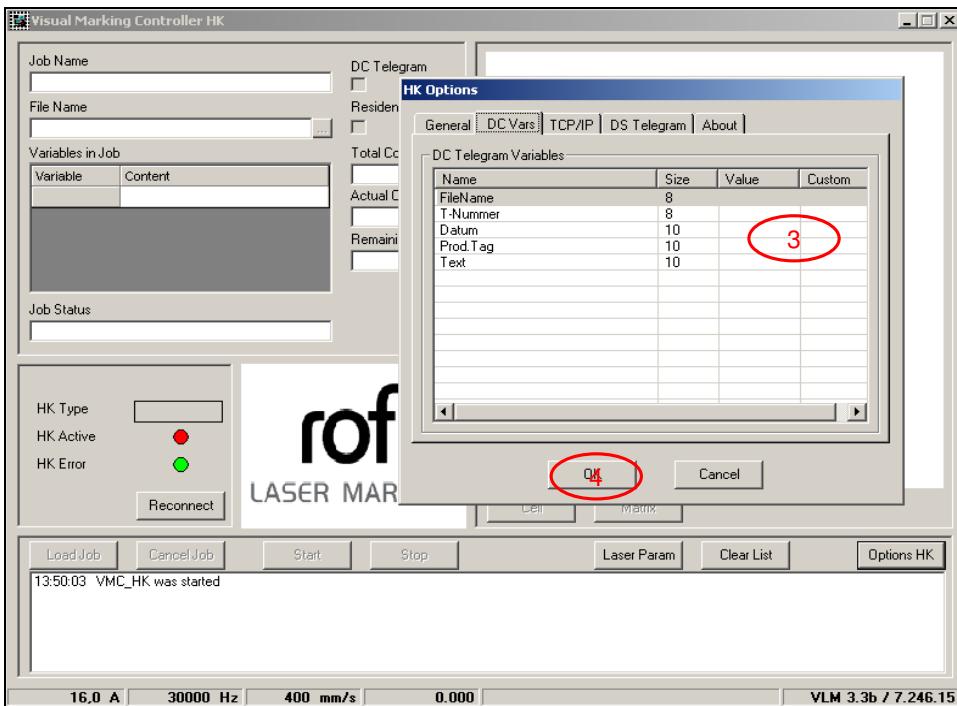
5.3.3 Definition of the DC Telegram Structure

Unlike the DA telegram, only contents of variables without the names of the variables are sent with the DC telegram. The names of the variables of the DC telegram are specified in the options of the VMC_HK.

Activating the DC telegram definition



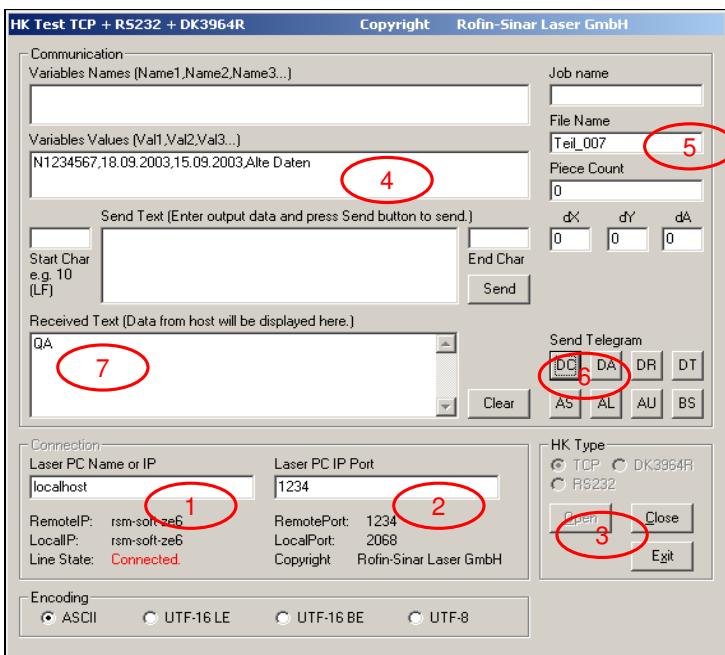
Defining the names of the variables and their length



5.3.4 Sending Telegrams from HK_Test to VMC_HK

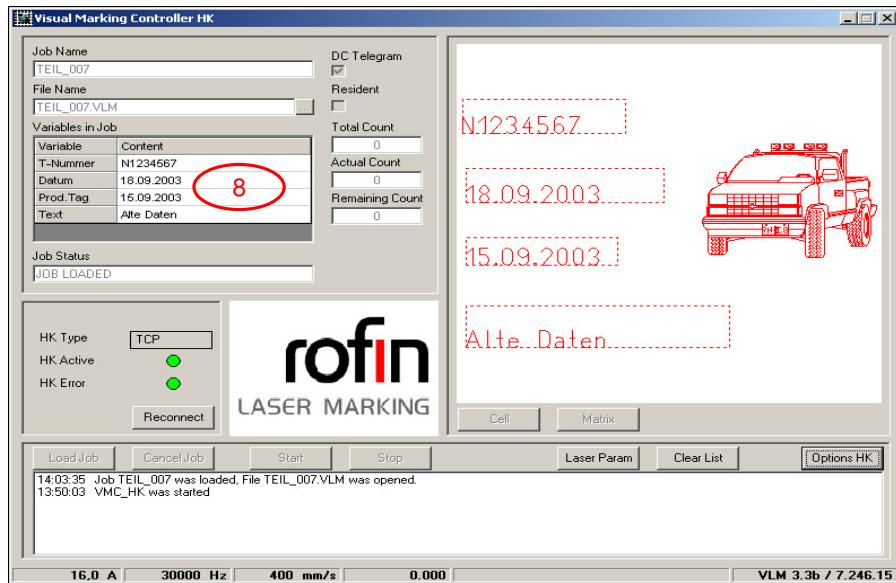
For information on the HK_Test Tool please refer to section "The HK_Test Tool". In this example a local TCP/IP connection with the IP "localhost", is started in one PC.

Sending the DA telegram with HK test



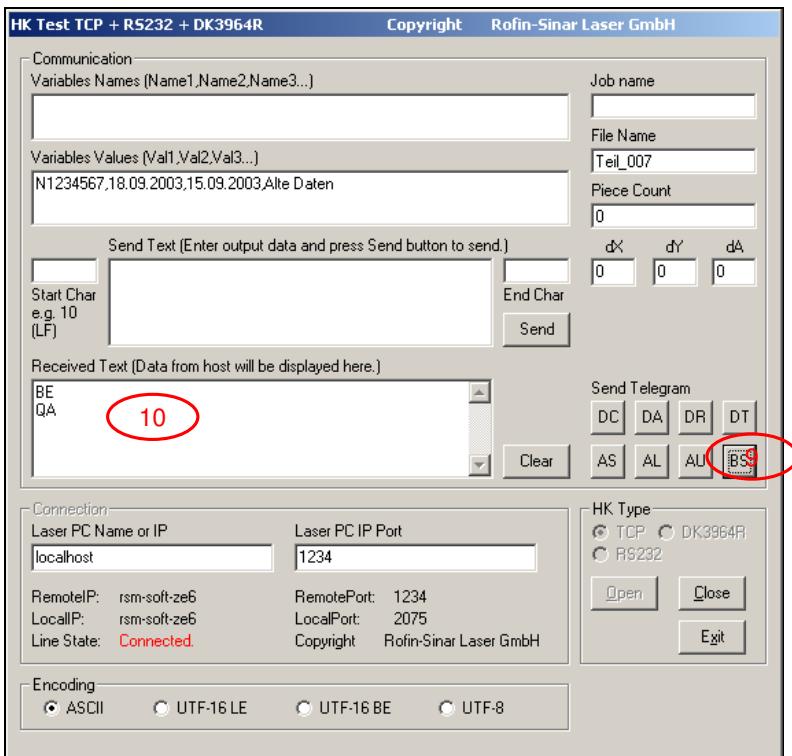
For testing the example, the HK_test tool has to be set as shown above. The DA telegram is sent to the VMC_HK by pressing the [DA] button.

Successful operation of the DC telegram

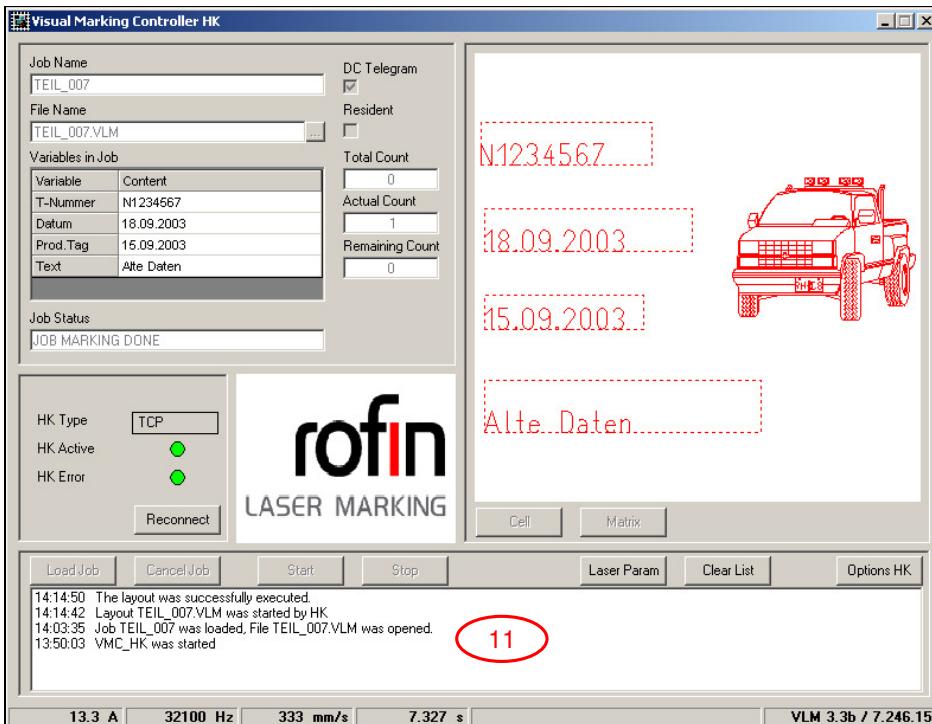


The VMC_HK replies in the example above with a QA telegram to HK_Test. If an error had occurred, the VMC_HK would have returned a QN to the HK_Test Tool.

Starting the marking by using the BS telegram



Executing the first marking

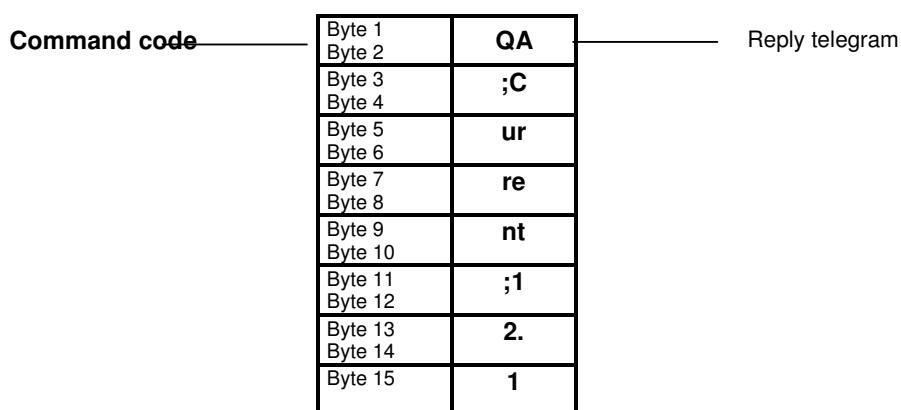
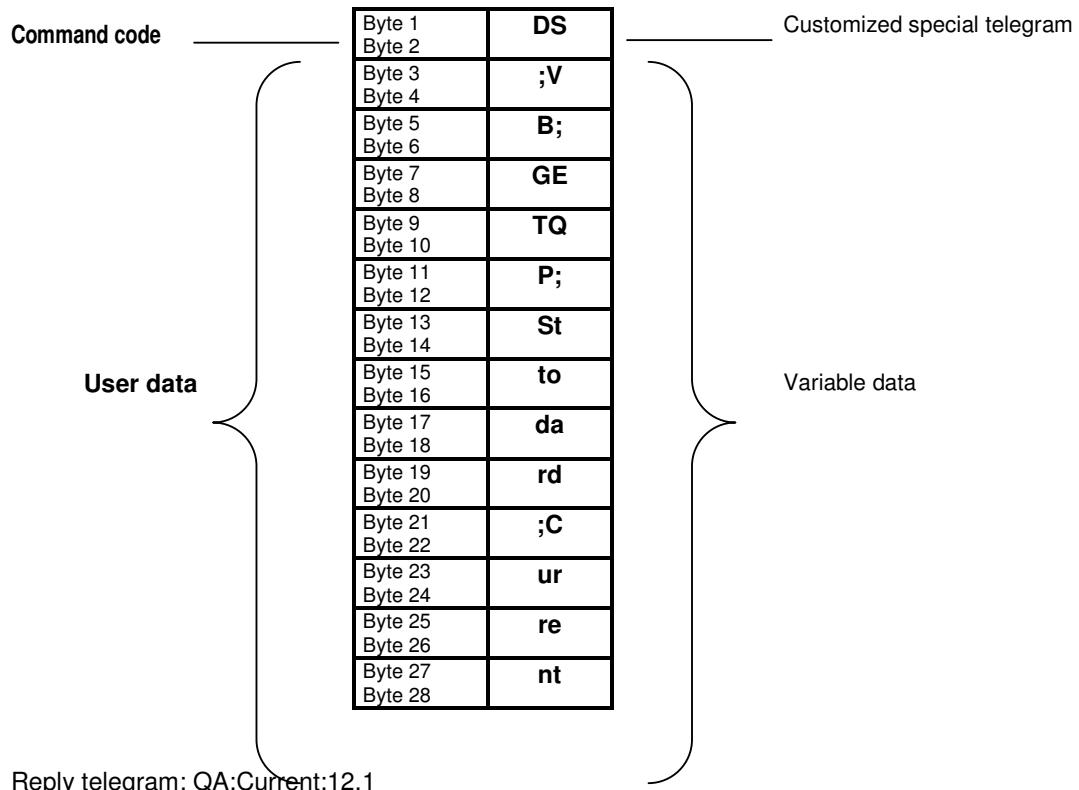


The job may be carried out as often as desired. The job does not have to be finished with an AL telegram.

5.4 Examples of DS telegrams

5.4.1 Example: Reading a laser parameter:

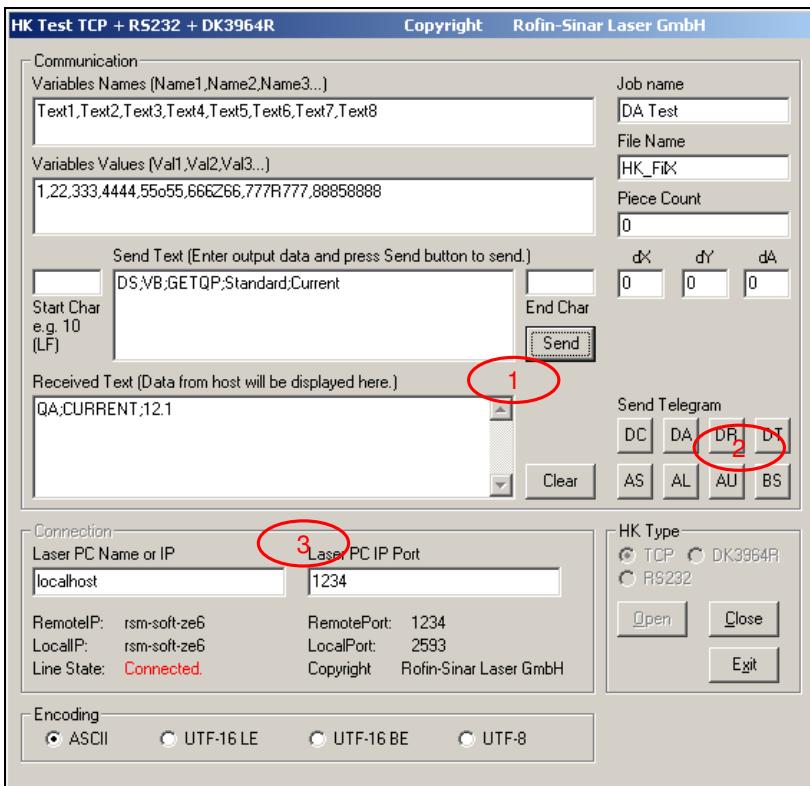
DS;VB;GETQP;Standard;Current



If the DS telegram is defective, the response will be QN.

For testing the DS telegrams the HK_Test Tool can be used. The structure of a DS telegram carried out in the input field **Send Text**:

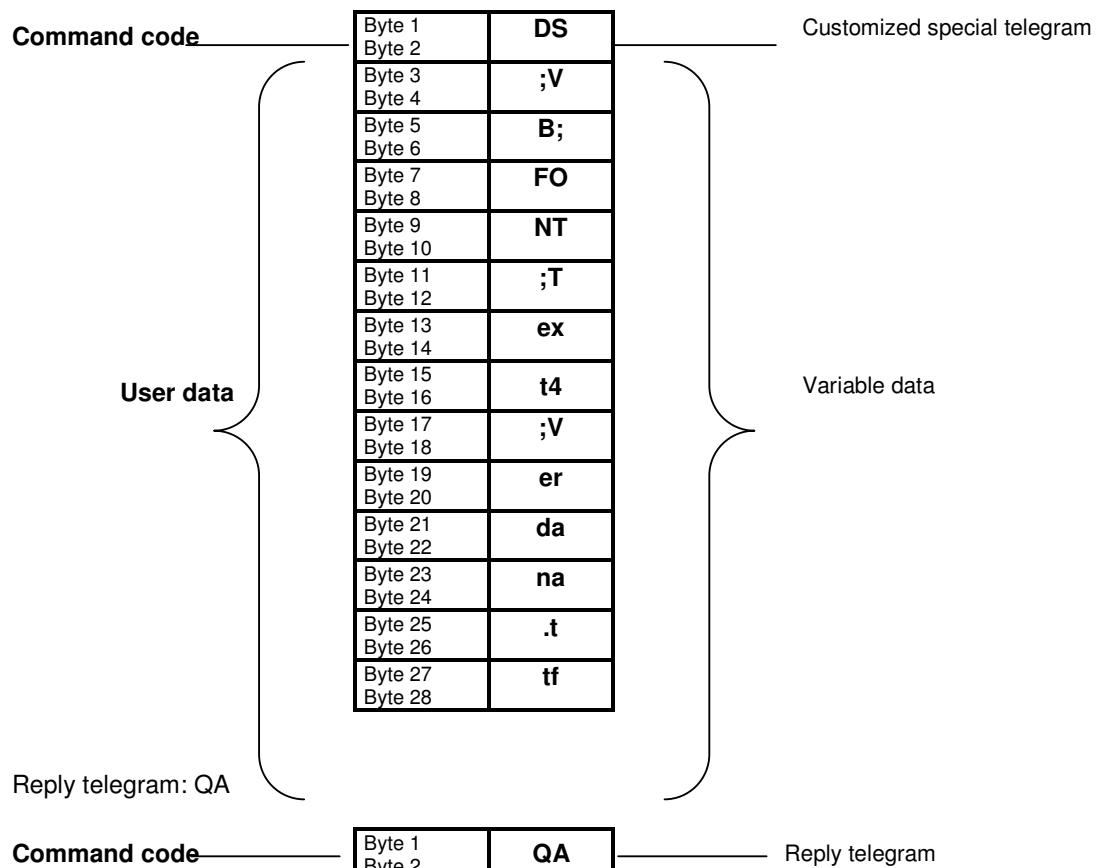
[Sending a DS telegram](#)



5.4.2 Example: Changing the font style of a text object

You can only change the font style after a DA or DC telegram has been sent successfully.

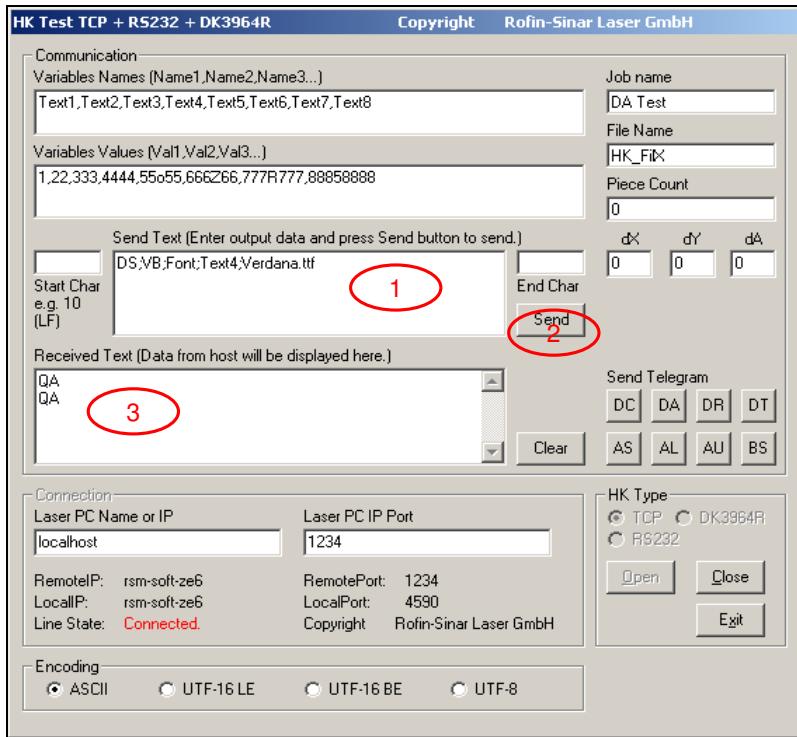
DS;VB;FONT;Text4;Verdana.ttf



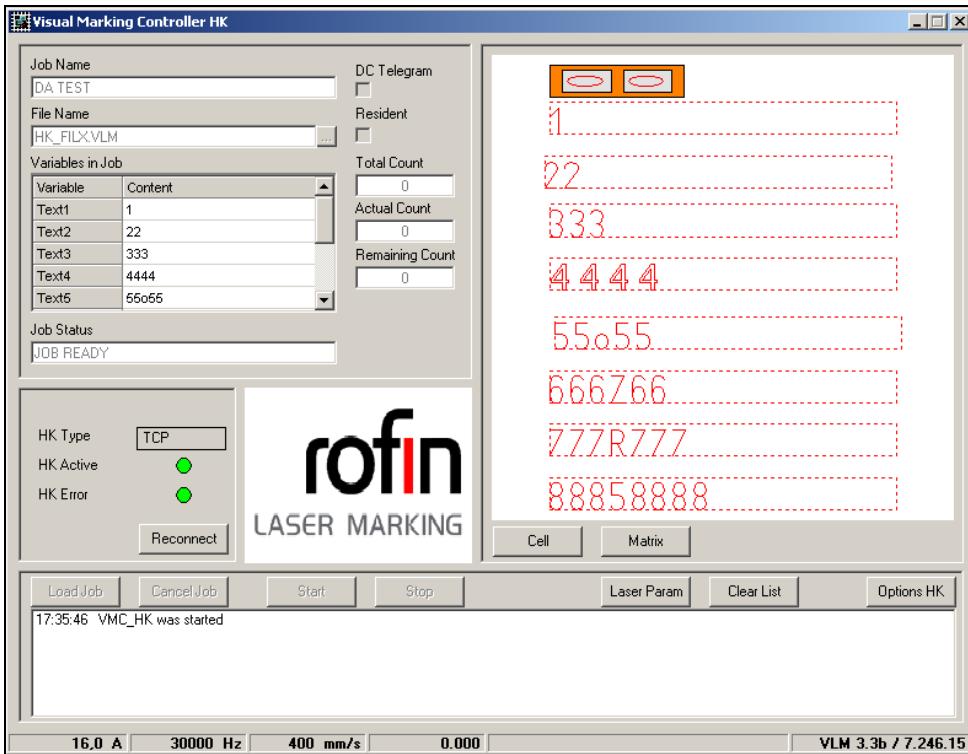
If the DS telegram is defective or the font is non-existent, the response will be QN.

For testing the DS telegrams the HK_Test Tool can be used. The structure of a DS telegram carried out in the input field **Send Text**.

Changing a font with a DS telegram

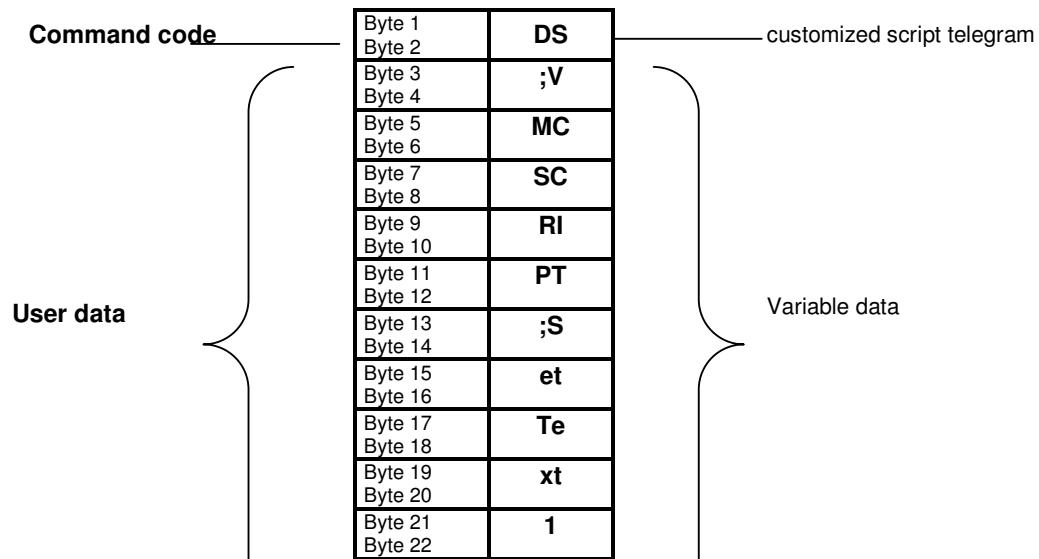


The result shown in the VMC_HK is for example as follows:



5.4.3 Example: Executing a VBS Script function (Visual Basic Script)

DS;VMCSCRIPT;SetText1



The VBS function has to be included in the script file (e.g. VMCScript.txt). Otherwise the response is QN.

```
Function SetText1()
    VLMActX.SetText "NewText1"
End Function
```

Reply telegram: QA or QN

6 Error and problem handling

The following errors may occur:

Error number	Error text	Cause / solution
0 = HK_ERROR_NO	No Error	No error.
1001 = HK_ERROR_WARNING	Warning: Unallowed telegram at this state	E.g.: DA->QA->BS->QN100 The telegram is not permissible in the current state.
1002 = HK_ERROR_TELEGRAM_UNKNOW	The telegram from host is unknown	E.g.: CP->QN1002 A command which is no longer supported or a defective telegram was sent.
1003 = HK_ERROR_TELEGRAM_LENGTH	The telegram length is not correct	E.g.: DC->QA->BSx->QN1003 The telegram length is not correct.
1004 = HK_ERROR_LOAD_FILE	Load of the job by HK failed	E.g.: DA->QA->AS->QN1003 Loading the *.VLM file failed.
1005 = HK_ERROR_JOB_RESIDENT	The resident job can't be deleted	A DR telegram cannot be deleted.
1006 = HK_ERROR_JOB_NEW	The resident job can't be deleted	E.g.: DC->QA->BS->DC->QN1006 At that time a new job cannot be loaded.
1007 = HK_ERROR_FILE_FOUND	File name is not valid or file could not be opened	A file name indicated in a DA or DC telegram could not be found on the PC of the laser marker.
1008 = HK_ERROR_VARIABLES	One or more variables could not be found in the drawing	The variables defined in the DA or DC telegram are set only partly in the *.VLM file.
1009 = HK_ERROR_LOAD_JOB	The actual shown job can't be loaded	The job can't be loaded in the current state. The job name is not correct. A DA telegram is required after an error status occurred.
1010 = HK_ERROR_JOB_START	Start marking of the drawing failed	The execution with the laser could not be started. Please check the execution of the *.VLM file with the VisualLaser Marker.
1011 = HK_ERROR_INTERRUPT	The job could not be interrupted	The job could not be interrupted because it is not loaded.

Error number	Error text	Cause / solution
1012 = HK_ERROR_DA_TELEGRAM	The DA telegram is not correct	The structure of the DA telegram is not correct.
1013 = HK_ERROR_DT_TELEGRAM	The DT telegram is not correct	The structure of the DT telegram is not correct.
1014 = HK_ERROR_EXECUTION	The drawing was not executed successfully	The execution with the laser marker was not successfully. Please check the execution of the *.VLM file with the Visual Laser Marker.
1015 = HK_ERROR_FONT	Font could not be set	The font could not be found or could not be assigned.
1016 = HK_ERROR_GETQP	Global QP Parameter could not be found	The global laser parameter requested in the DS telegram is not existent.
1017 = HK_ERROR_SETQP	Global QP Parameter could not be set	The global laser parameter specified in the DS telegram is not existent.
1018 = HK_ERROR_VMC_SCRIPT	VMC_Script could not be executed	The Visual Basic Script function specified in the DS telegram is not existent or defective.
1019 = HK_ERROR_DELETE_JOB	No job to delete, or the actual shown job can't be deleted	An AL telegram was sent without a job being loaded (anymore).
1020 = HK_ERROR_DS_TELEGRAM	The DS telegram is not correct	The parameters specified in the DS telegram are not correct or not known.
1021 = HK_ERROR_POWER_DISABLED	The power measurement is not possible with this laser system	A power telegram was sent although there is no power measuring head available.
1022 = HK_ERROR_VISION_DISABLED	There is not vision system active	A vision telegram was sent although there is no vision system available.
1023 = HK_ERROR_LASER_DISABLED	There is not laser system active	A laser telegram was sent although there is no laser available.
1024 = HK_ERROR_POWER_COMMAND	The execution of a laser command failed	General error after the unsuccessful execution of a power telegram. For more information please refer to VMC_HK.log.
1025 = HK_ERROR_VISION_COMMAND	The execution of a vision command failed	General error after the unsuccessful execution of a vision telegram. For more information please refer to VMC_HK.log.

Error number	Error text	Cause / solution
1026 = HK_ERROR_LASER_COMMAND	The execution of a power command failed	General error after the unsuccessful execution of a laser telegram. For more information please refer to VMC_HK.log.
1027 = HK_ERROR_GENERIC	Generic error in VMC_HK or in a component	General error in VMC_HK or in a component used therein. For more information please refer to VMC_HK.log.
1028 = HK_ERROR_LASER_GETATTRIB UTE	The execution of a get attribute command failed	The VMC does not run with the RCU software or the specified attribute does not exist.
1029 = HK_ERROR_SETATTRIBUTE	The execution of a set attribute command failed	The VMC does not run with the RCU software or the specified attribute does not exist.
1030 = HK_ERROR_ALARM_LASER_COMM	Alarm - Laser controller communication.	Communication problem with the RCU software.
1031 = HK_ERROR_ALARM_LASER	Alarm - Laser not ready.	The laser was not ready for operation when the marking was startet. Please wait until the laser is in the "Operating" status.
1032 = HK_ERROR_ALARM_LASER_POWER	Alarm - Laser power.	Problem with the power measurement or the power regulation.
1033 = HK_ERROR_ALARM_PLC_COMM	Alarm - PLC communication.	Communication error when exchanging commands or data with an external PLC which is connected via RS232. For more details please refer to the additional messages in the status list of the VMC_HK.
1034 = HK_ERROR_ALARM_PLC_AXES	Alarm - Axes controller.	Error during control of axis such as software limit switch or hardware limit switch or internal motor error or axes timeout. For more details please refer to the additional messages in the status list of the VMC_HK.
1035 = HK_ERROR_ALARM_BEAMSWITCH	Alarm - Beamswitch.	Error beam switch. In general a hardware error caused by unsuccessful switching.

Error number	Error text	Cause / solution
1036 = HK_ERROR_ALARM_APERTURE	Alarm - Aperture.	The mode aperture could not be switched or reading back the position failed.
1037 = HK_ERROR_ALARM_STEPEANDREPEAT	Alarm - Step and Repeat.	I/O hardware signal process failed in the step and repeat mode.
1038 = HK_ERROR_ALARM_GALVO	Alarm - Galvo not ready.	The galvo head indicates a hardware error.
1039 = HK_ERROR_ALARM_MO_EXECUTE	Alarm - Marking object.	The execution of a marking object was interrupted. For more details please refer to the additional messages in the status list of the VMC_HK.
1040 = HK_ERROR_ALARM_MO_RESOURCES	Alarm - Missing resources.	One or more resources as Logo file, Bitmap file or VLM reference file could not be found. For more details please refer to the additional messages in the status list of the VMC_HK.
1041 = HK_ERROR_ALARM_UNKNOWN	Alarm - Unknown exception.	An internal software error in one of the VLM software components occurred. For more details please refer to the additional messages in the status list of the VMC_HK.
1042 = HK_ERROR_ALARM_STOP	Alarm - Marking stopped.	The execution of a layout was interrupted. The stop could have been triggered by an external stop or by an user stop.
1043 = HK_ERROR_ALARM_XXDRIVER	Alarm - XXDriver.	The system driver that controls the laser PC board (ALI) reports an internal software error. For more details please refer to the additional messages in the status list of the VMC_HK.
1044 = HK_ERROR_ALARM_FIELD_CORR	Alarm - error computing a correction table.	Unable to use the field correction. Please check the correction file.
1045 = HK_ERROR_ALARM_NO_MARK	Alarm - some objects are not marked.	Not all marking objects of the layout have been executed.
1046 = HK_ERROR_ALARM_NONE	Alarm: None.	No alarm, the alarm has been deleted
1100 = HK_ERROR_VARIABLES_EMPTY	One or more variables are empty.	The variables defined in the DA or DC telegram are set without content. Options "Variables may not be empty" is activated.

6.1 Problems - FAQ (Frequently Asked Questions)

Serial interface (RS232 only and DK3964R)

The serial communication does not work. The VMC_HK no longer reacts

Possible reasons:

- ◆ Is the correct host connection type in the dialog of the **HK Options** selected (RS232 or DK3964R)?
- ◆ Did you set the ports for the RofinSinar PC correctly under Windows NT?
 - ➔ Under Start/Settings/Control Panel/Ports/Settings/Advanced the I/O address and the IRQ may not be set to *Default* but:
 - COM1: I/O Port Address = 3F8, IRQ = 4
 - COM1: I/O Port Address = 3F8, IRQ = 3
 - COM3: I/O Port Address = 3E8, IRQ = 15, if this corresponds to the PCLD board settings.
- ◆ Is the cable connected to the correct port on the two PCs?
- ◆ Do the ports work? Check on other ports, if possible.
- ◆ Is the used serial cable a null modem cable?
- ◆ Is the cable defective? Check with another cable, if possible.
- ◆ Are the serial parameters set equally on both sides?
 - ➔ Baud rate equal, parity (is default even after inst.), RTS, DTR....

The serial communication does not work properly

Possible reasons:

- ◆ Which test program is used for the communication?
 - ➔ Use RofinSinar HK_Test programs. These programs are tested and exclude an error on part of the host. The programs supplied on the VLM CD and have to be installed on the host PC. A test program is available for all types of host communication.

Network connection (TCP/IP)

How to find the IP address and the port of the PC of the laser marker:

- ◆ How to find the IP address and the port of the PC of the laser marker:
 - ➔ The IP/Address, the name of the computer and the port of the PC of the laser marker is displayed under HK Options / TCP. Please use these values on part of the host in order to set up a connection to the PC of the laser marker.

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