Instruction manual

MU-705
Hand-held Programming Device

Item number	WNR	
3233528	CWA-60060967	MU-705
3226594	CWA-60060968	MU-705
3226595	CWA-60060969	MU-705 TF

Table of contents

1 General information and safety

1.1 Information about the manual

This manual contains technical information and operating notes about devices of the type:

MU-705   Hand-held Programming Device
MU-705 TF   Hand-held Programming Device tropicalized

It gives important information about the device.

Please read this manual carefully before using the device!
It will ensure smooth operation and prevention of errors, defects and damage to the system. Moreover, universal safety and accident prevention specifications must be implemented at sites where the devices are in use.

The manual includes important instructions regarding the operation and safety; it is a part of the product and must readily available, close to the device, so that it is accessible to the personnel at all times.

Every person who is assigned to work on or with the device must have read and understood this manual before working with the device. This is mandatory even if the concerned person has already worked with such a device or the like, or has been trained by the manufacturer.

> *Note!*
> *You can find the user manual and the software for the hand-held programming device as downloads on our website www.conductix.com.*
> *Please download the current "MU-705 Package" under Downloads/Software. This contains the user manual in several languages, the PC Software "MU-705 Utility", as well as the necessary driver unit for the MU-705.*

1.2 Symbols in the documentation

There are warning instructions and symbols in this description. It is absolutely mandatory to comply with these and follow them. These are working aids and they will warn you of possible damage to property and personnel. Always follow these instructions. Moreover, always follow the universal safety specifications and accident prevention specifications.

Warning!
This symbol along with the signal word "Warning" refers to a potentially dangerous situation that can lead to serious injuries or fatality if it is not avoided.

Caution!
This symbol along with the signal word "Caution" refers to a potentially dangerous situation that can lead to minor injuries and damage to property if it is not avoided.

Note!
This symbol indicates that there are additional and important information and tips on the relevant topic.

See also!
This symbol indicates that other detailed descriptions on the particular topic are available or provides references to other sections in this documentation.

1.3 Limitation of liability

All data and instructions in this description have been compiled taking into consideration the applicable standards and specifications, the state-of-the-art technology and our knowledge and experience gained over the years.

Conductix-Wampfler Automation GmbH is not liable for any damage or operational disorders arising due to:

- Non-compliance with the description
- Improper use
- Employment of untrained personnel
- Independent remodelling and modification of the device

Moreover, non-compliance with the description absolves Conductix-Wampfler Automation GmbH of the warranty obligation.

1.4 Copyright

The contents of this description should be treated as confidential. It is meant solely for persons working with the device. Handing over this technical document to third parties without written permission of the manufacturer is not allowed.

> *Note!*
> *The content details, texts, drawings, images and other illustrations of the description are protected by copyright and are subject to the industrial property rights. Any improper utilization is punishable by law.*

1.5 Conformity

Devices made by Conductix-Wampfler Automation GmbH have been designed to comply with EU directives.

Please contact Conductix-Wampfler Automation GmbH if you wish to obtain a copy of these EU declarations of conformity.

1.6 Proper use

The Hand-held programming device MU-705 is used to programming, parameterizing and manually control Conductix/LJU devices.

> *Warning!*
> *Danger due to improper use!*
> *Any improper use and/or different use of the device can lead to dangerous situations.*
>
> *Therefore:*
> - *Only use the device in a proper manner.*
> - *Under all circumstances, comply with all technical data and permissible conditions at the site of operation.*
> - *Do not deploy the device in areas with explosion hazard and in environments with hazardous oils, acids, gases, vapors, dust, radiation, etc.*

1.7 Spare parts and repair

> *Warning!*
> *Risk of injury due to spurious spare parts and incorrect repair!*
> *Spurious or faulty spare parts and repair can lead to damage, malfunctions or total failure and can impair safety.*
>
> *Therefore:*
> - *Use only original spare parts of the manufacturer.*
> - *Replace defective devices immediately and send them in for repair.*

	Conductix-Wampfler Automation GmbH
---	Handelshof 16 A | 14478 Potsdam | Germany
Type	MU-705
WNR	LJU-60060xxx
S/N	LJU0000001234
Year	03/2022
4.8 V DC	
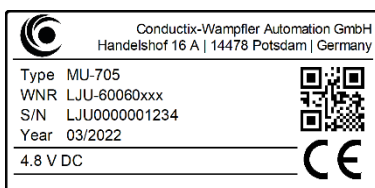
When **ordering a spare part**, specify the plant number **WNR** of the component and send it to the address given on the inner side of the covering sheet (page 2). The plant number is given on the type plate of the individual components. (see figure)

Send in the defective device for **repair** with a short description of the error scenario to the address given on the inner side of the covering sheet (page 2).

1.8 Warranty

The warranty covers only manufacturing defects and component defects.

The manufacturer is in no way responsible for damage during transit or unpacking.
In no case and under no circumstances shall the manufacturer be liable under warranty for defects or damage caused by improper use, incorrect installation or impermissible operating conditions, or due to dust or aggressive substances.

Consequential and accidental damage are excluded from the warranty.

The warranty is valid for 12 months from the commencement of operation, however, maximum 24 months after delivery.

Resellers or distributors may negotiate different warranty periods in accordance with their terms and conditions of sale and delivery.

If you have further questions relating to the warranty, please contact your supplier.

1.9 Customer service

Our customer service is available to provide technical information.
Information about the responsible contact persons can be obtained via telephone, fax, e-mail or the Internet; see contacts on the inner side of the covering sheet (page 2).

1.10 Modifications and alterations

To avoid danger and to ensure optimal performance, no modifications, remodelling or add-ons are allowed on the device unless expressly approved by Conductix-Wampfler Automation GmbH.

Warning!
Risk of injury due to design modification!
Unauthorized technical modifications can lead to considerable damage to persons and property.

Therefore:
- *Replace the defective device!*
- *Replace it with a device of the same model.*

1.11 Personnel and qualification

Warning!
Risk due to improper use!
Improper operation can lead to serious damage to persons or property.

Therefore:
- *It may be operated only by qualified technical personnel.*
- *During manual operation, ensure that there is no risk to persons from the manual operation and that there are no persons in the working area of the vehicle.*

1.12 Disposal instructions / environmental specifications

Provided no agreement for take-back or disposal has been made, the individual components of the device must be appropriately dismantled, segregated and disposed of or recycled according to the current stipulations.

Materials marked with the recycling symbol or green dot have to be disposed of using the appropriate recycling method.

1.13 Battery disposal

The device contains batteries.

Dispose of them according to applicable provisions:

- Do not dispose of batteries as domestic waste.
- Dispose of batteries at local collection points or have a professional company dispose of them.
- Do not short circuit batteries.
- Tape battery contacts.

2 Characteristics and Design

2.1 Characteristics

The hand-held programming device MU-705 is used to programming, parameterizing and manually control components that are fitted with an electronic vehicle controller and have the accompanying software.

The data is transmitted between the MU-705 and the controller by means of infrared and is thus compatible with the controllers of the product lines 6xx, 7xx with corresponding software and with all controllers of the latest generation 8xx.

The hand-held programming device was developed primarily for parameterizing and updating the vehicle controllers. Moreover, it has features like e.g. calling of vehicle information, manual controlling of vehicles etc., which are explained in detail in the following description.

Moreover data backups and modification of parameterization data are possible by connecting the MU-705 to a computer which has the MU-705 Utility Software installed on it (separate description).

The individual functions of the MU-705 are controlled by means of menu navigation.

Menu navigation!
The menu navigation in the hand-held programming device varies, depending on the project and can differ from those given in this manual.
The menu navigation to your controller is given in the separate descriptions to your controller.

2.2 Design

- The housing of the hand-held programming device MU-705 is made of impact-resistant material.

- The MU-705 has a clearly visible LCD-display ① and a user-friendly membrane keypad ②.

- The 18 buttons of the keypad are embossed, which prevents the buttons from being accidentally pressed with the correct amount of pressure.

- IR transmitter diodes ③ for IR transmission are located at the front of the device.

- The MU-705 is connected to a computer via a USB interface ④; it is switched on by depressing a press button ⑤. Button and connection are at the bottom side of the device.

- The power is supplied by an accumulator ⑥ at the back side of the device. The accumulator is charged through an external charging device.

3 Operation

3.1 Functioning

The 18 buttons of the MU-705 are used not only for inputting the vehicle parameters but also for remote controlling and acknowledging errors.

- The arrow keys ↑↓ are used for scrolling through the menus. You can go into the relevant sub-menu by selecting the desired option with ▸ and confirming with [Enter] or by directly selecting using the number keys.

- The function buttons F1 – F3 are assigned depending on the required action.

- You can go back to the previous menu using the ESC-key.

The commands/data are transmitted via infrared.

For every sending/receiving function of the remote control, the IR transmitter cone must be directed towards the display window of the controller or the display window of the external IR head with a tolerance of ± 16°. The maximum distance between the MU 705 and the receiver should not exceed 1 m.
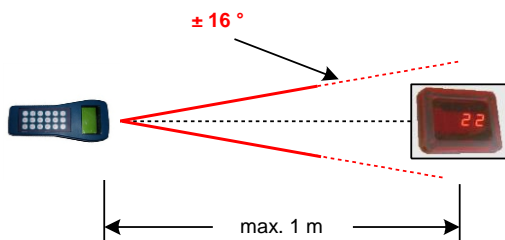
3.2 Switching on/off the MU-705

The MU-705 is **switched on** using the ON-button on the bottom side of the device.

Keeping the ESC-button on the keypad pressed for some time will **switch off** the hand-held programming device.

4 The Menus

4.1 Menu-Overview

After the MU-705 is switched on and the controller type is selected (see also point 4.2.3), the MU-705 display appears, which consists of serially numbered menu items, an information bar and a scroll display.

Menu items
Short information/ content of menu

Information bar
General information (battery, shut down time) variable functions of F1 – F3

Main menu
1. Parameters
2. Test
3. Tag/Number
4. Tables
▶5. MU config.

ST694-Test

Scroll display
Hint to more menu items
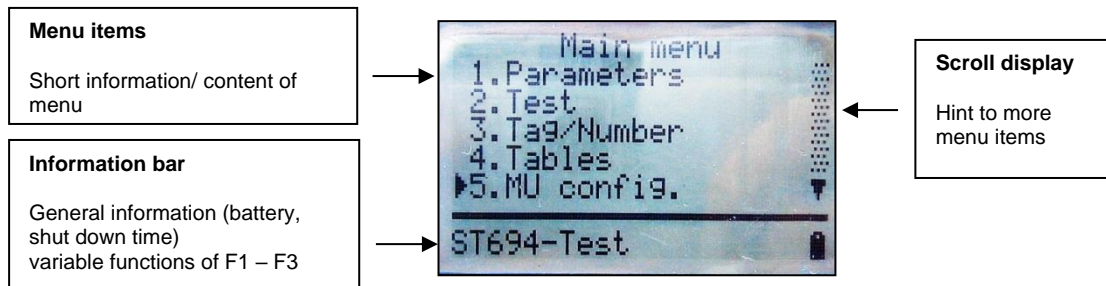
The MU-705 has a simple menu navigation with main and sub-menus, which guides the user to the particular function/action in an easy to understand manner:

main menu	
1. Parameters	1. Change of vehicle parameters, type etc.
2. Test	2. Commands, remote controlling, infrared
3. Tag/Number	3. Target info, vehicle number, display vehicle
4. Tables	4. Speed tables, hoist tables, rotation tables
5. MU config.	5. MU settings - display, language, infrared etc.
6. Information	6. Software versions
7. Program files	7. Download manager, memory management
8. Accessories	8. Stop clock, games, calculator
9. Identification	9. Control parameters and angle adjustments (only forST-8xx series)

4.2 Menu Parameters

1. Parameters		1. Write Data 2. Read Data 3. Modify Data 4. Verify Data

Note!

The controller type configured in the MU must necessarily match with the controller description. (see point 4.2.3/3)

4.2.1 Write Data

The parameters and the configuration stored in the MU are transferred to the controller via the menu item "Write Data".

1. Select menu item.
2. Confirm the question "Send?" with the F1 [Yes] button.
3. Establish infrared communication.

Note!

If the data need not be sent to the controller, cancel the operation by pressing F3 [No] or ESC.

4.2.2 Read Data

The parameters and the configuration from the controller are read via the menu item "Read Data".

1. Select menu item.
2. Establish infrared communication.
3. Confirm the question "Delete?" with the F1 [Yes] button.
4. Re-establish infrared communication.
5. The transmission of data is confirmed by the message "Upload xx param."

Note!

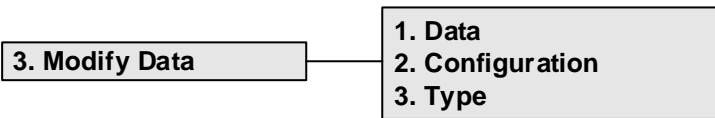*The parameters and the configuration stored in the MU are overwritten by the read data. If the data need not be overwritten, cancel the operation by pressing F3 [No] or ESC.*

4.2.3 Modify Data

```
┌─────────────────────┐       ┌─────────────────────────┐
│  3. Modify Data     │───────│ 1. Data                 │
└─────────────────────┘       │ 2. Configuration        │
                              │ 3. Type                 │
                              └─────────────────────────┘
```

Caution!
Important controller settings are changed in this menu item. Notes pertaining to the settings are to be taken from the separate software description of the used controller.

1. Data

Individual parameters of the controller can be changed via the menu item "Data". The new data can be input via the keypad; the individual parameters can be selected using the arrow keys.

If the parameter names are stored in multiple languages in the MU, you can switch between the languages using the F3 button [Language].

The parameters configured value and the unit are displayed in the top part of the display. The parameter description is displayed in the lower part. There is also a message indicating the number of the parameter in the table (e.g. 14/53). After a parameter is changed, it is immediately copied and stored in the MU by quitting the menu item with ESC.

The changed data/parameters can be transmitted immediately to the controller with the button F1 [Send], via the option "Write Data". (see point 4.2.1)

Caution!
*All the parameters **and** the configuration are transmitted to the controller. Make sure that the complete parameter record and the configuration are correctly inserted.*

2. Configuration

The configuration settings (e.g. error display, unconditional manual operation etc.) for the controller are made in this menu item. Information is to be taken from the software description of the controller.
The setting to be changed is selected using the arrow keys and the setting is set or revoked by using the [Enter] button.

- ◉   Option/setting selected
- ○   Setting deselected

If the configuration is stored in multiple languages in the MU, you can switch between the languages using the F3 button [Language].

The changed configuration can be transmitted immediately to the controller with the button F1 [Send], via the option "Write Data". (see point 4.2.1)

> ### *Caution!*
> *The configuration **and** all the parameters are transmitted to the controller. Make sure that the complete parameter record and the configuration are correctly inserted.*

3. Type

The MU can store parameter records and configuration settings of multiple controller types. The controller type with which the MU should communicate is selected through this menu item.

Select the controller type using the arrow keys and press the button F1 [Act.].
The type stored in the MU is deleted by pressing the button F3 [Delete].

4.2.4 Verify Data

The option "Verify Data" compares the checksums of the parameter records of the controller and that of the MU-705.

1. Select menu item.
2. Establish infrared communication.
3. Wait till the checksums appear in the display of the MU.

If both the data records match, the checksums (CRC) for the MU and the controller are the same and displayed as such.

4.3 Menu Test

2. Test

1. PCM signal
2. Remote Control
3. IR Test
4. BIOS Exceptions
5. Error log
6. Memory
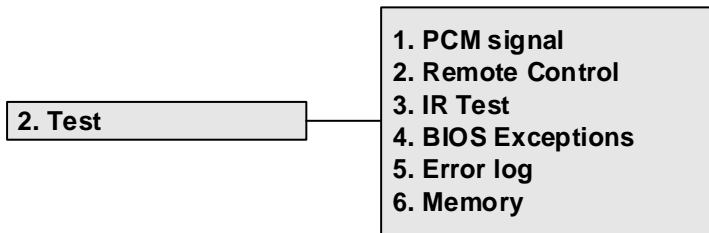
4.3.1 PCM signal

Function not available.

4.3.2 Remote Control

Warning!

Risk due to improper use!

Improper operation can lead to serious damage to persons or property.

During manual operation, ensure that there is no risk to persons from the manual operation and that there are no persons in the working area of the vehicle.

In this mode, the MU-705 can substitute the manual remote operation to a certain extent and control the vehicle remotely; the range is however limited to one meter.

1. Select menu item.
2. Establish infrared communication.

Switch the vehicle controller to manual mode (H displayed on the vehicle controller) by pressing the [5/∗] button on the MU-705.

Manual/Remote control mode stops when the [7/#] button is pressed. The automatic mode becomes active again.

Example button assignment:

Button **[F3]** or **[→]** or **[6]**	forwards
Button **[F1]** or **[←]** or **[4]**	backwards
Button **[↑]** or **[2]**	hoist
Button **[↓]** or **[8]**	lower
Button **[5/✱]** display **[5/✱]**	manual operation slow
Button **[5/✱]** display **[5/✱]**	manual operation fast
Button **[7/#]**	automatic mode

> *Button assignment!*
>
> *The functions of the buttons are specific to projects! The button assignment described above can thus differ.*
> *See separate software description to your controller!*

4.3.3 IR Test

This function is used for testing infrared devices.

With the help of this option, protocols from transmitting devices can be received. These protocols are displayed on the display and converted. Thus e.g. by pressing a button the transmitting device, it is possible to check in the receiving MU whether the correct protocol has been sent.

1. Activate IR test.
2. Direct the IR-window towards the IR-transmitter of the device to be tested.
3. Send the protocol (e.g. press the button) from the test device.
4. The received protocol appears in the display.

Other MU, LBS (read-write station) and remote controls are supported.

4.3.4 BIOS Exceptions

Evaluation of software error messages Controller-BIOS.
DEBUG information for the Conductix-Wampfler staff.

4.3.5 Error log

5. Error log	1. Read 2. View 3. Clear
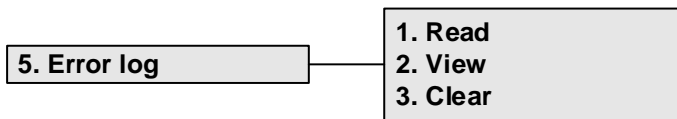
The error log of vehicles can be read or deleted from the vehicle controller via the menu.

> *Note!*
> *The error log output depends on the controller/project and is supported only if the vehicle controllers have implemented this option in their controller software.*

Read:

1. Establish infrared communication.
2. Press button 1. Errors are read from the controller.

View:

To display the error messages read from the controller, select the menu item "View".

Clear:

1. Select menu item "Clear".
2. Establish infrared communication.
3. Press F1 [Yes] to delete the error log in the controller.

4.3.6 Memory

This menu item reads individual memory areas.
The read information is used for the memory management of the controller software and is used only by the Conductix-Wampfler staff.

4.4 Menu Tag/Number

```
                                    1. Tag
                                    2. Number
   3. Tag/Number                    3. Display
                                    4. WNR/Ser
                                    5. Type
```

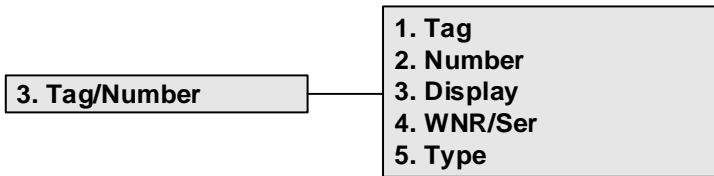## 4.4.1 Tag

In this menu item, target details of the system control (project-dependent) can be read from or written into the vehicle controller.

Read tag:

1. Select menu item.
2. Establish infrared communication.
3. Press F1 [Read]. The current target is read.
4. The target appears in the display of the MU.

Write tag:

1. Select menu item.
2. Input the target via the keypad (four-digit, replace unused places with '0').
3. Establish infrared communication.
4. Press F3 [Write]. The target is written.
5. The target appears in the display of the MU.

4.4.2 Number

The vehicle number can be read from or written into the vehicle controller by means of this menu item.

Read vehicle number:

1. Select menu item.
2. Establish infrared communication.
3. Press F1 [Read]. The current vehicle number is read.
4. The vehicle number appears in the display of the MU.

Write vehicle number:

1. Select menu item.
2. Input the vehicle number via the keypad (four-digit, replace unused places with '0').
3. Establish infrared communication.
4. Press F3 [Write]. The vehicle number is written.
5. The vehicle number appears in the display of the MU.

4.4.3 Display

This menu selects the display mode of the vehicle controller (e.g. display of position, voltages etc.).

> **Display modes!**
> The individual display modes are to be referred from the separate description of the controller!

Read display mode:

1. Select menu item.
2. Establish infrared communication.
3. Press F1 [Read]. The current display mode is read.
4. The current display mode appears in the display of the MU.

Modify display mode:

1. Select menu item.
2. Input the display mode via the keypad.
3. Establish infrared communication.
4. Press F3 [Write]. The display mode to be displayed is written.
5. The display mode appears in the display of the MU.

F2 [Ext]:   Function not available.

4.4.4 WNR/Ser

Writes the plant number WNR and serial number SER into the controller.
Only for internal use, password-protected by Conductix-Wampfler!

> **Read WNR/Ser!**
> The plant and serial number is read via the menu item "BIOS info" (see point 4.7.1).

4.4.5 Type

This menu item is used to read out the car type and extra type (project specific) from the car control or to write the car type and extra type to the control.

Read car type and extra type:

1. Select menu item.
2. Establish infrared communication.
3. Press F1 [Read] → Current car type and extra type are read out.
4. Car type and extra type appear in the MU display.

Write car type and extra type:

1. Select menu item.
2. Enter car type or extra type (three-digit, 0…255, replace unused digits by '0'). Press F2 to switch between car type ("Type.") and extra type ("Ext.").
3. Establish infrared communication.
4. Press F3 [Write] → Car type and extra type are written.
5. Car type and extra type appear in the MU display.

4.5 Menu Tables

```
                          ┌────────────────────┐            ┌──────────────────┐
                          │ 1. …..-Tab          │            │ 1. Write Table   │
 ┌──────────────┐         │ 2. …..              │            │ 2. Read Table    │
 │  4. Tables   │─────────│ 3. Tab. group…      │   ┌──────────────┐  3. Modify Table │
 └──────────────┘         │ 4. Tab. group…      │───│ 1. …..-Tab   │  4. FCS          │
                          │ 5. All              │   │ 2. …..       │  5. Clear Table  │
                          └────────────────────┘   └──────────────┘──────────────────┘
                                                    ┌──────────────────┐
                                                    │ 1. Write         │
                                                    │ 2. Read          │
                                                    │ 3. FCS           │
                                                    └──────────────────┘
```
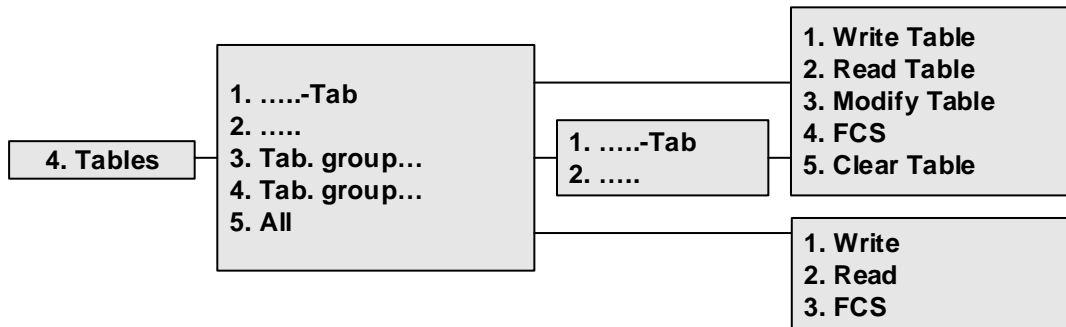
The Tables menu contains the tables pre-defined for the project, like e.g. speed tables. The user can change/adjust the configured values and transfer the changed values to the controller.

The individual tables are directly present in the view or are grouped into individual table groups (project-dependent).

> **Note!**
>
> *The controller type configured in the MU must necessarily match with the controller description. (see point 4.2.3/3)*

4.5.1 Write Table

The table is transferred to the controller via the menu item "Write Table".

If the data need not be sent to the controller, cancel the operation by pressing F3 [No] or ESC.

1. Select menu item.
2. Confirm the question "Send?" with the F1 [Yes] button.
3. Establish infrared communication.

4.5.2 Read Table

The table is read from the controller via the menu item "Read Table".

1. Select menu item.
2. Confirm the question "Clear?" with the F1 [Yes] button.
3. Establish infrared communication.
4. The table is displayed in the MU once the transfer is successfully completed.

> *Note!*
> *The table values stored in the MU are overwritten by the read data.*

4.5.3 Modify Table

The content of the table is displayed and can be edited via the menu item "Modify Table".

The new data can be input via the keypad; the individual values can be selected using the arrow keys.

The value to be edited is visible in the topmost line of the display. The new values are copied immediately after they are changed and saved by quitting the menu item with ESC.

After the changes are made, the new values can be transferred to the controller as described under point 4.5.1 or 4.5.6/1.

4.5.4 FCS

The option "FCS" compares the checksums of the table of the controller and that of the MU-705.

1. Select menu item.
2. Establish infrared communication.
3. Wait till the checksums appear in the display of the MU.

If both the data records match, the checksums (FCS) for the MU and the controller are the same and displayed as such.

4.5.5 Clear Table

Go to the menu item "Clear Table" and then confirm the question 'Clear?' by pressing the button F1 [Yes] to delete the content of the currently displayed table in the MU.

If the content of the table need not be deleted, cancel the operation by pressing F3 [No] or ESC.

4.5.6 All

Select this option to simultaneously transfer, read and match all the tables stored in the MU and in the controller.

1. Write

Select the menu item "Write" to transfer all the tables stored in the MU to the controller.

1.   Select menu item.
2.   Confirm the question "Send?" with the F1 [Yes] button.
3.   Establish infrared communication.

If the data need not be sent to the controller, cancel the operation by pressing F3 [No] or ESC.

2. Read

> *Note!*
> *All the table values stored in the MU are overwritten by the read data.*
> *Press the F3 [No] or ESC to cancel the operation.*

Select the menu item "Read" to read all the tables stored in the controller.

1.   Select menu item.
2.   Confirm the question "Clear?" with the F1 [Yes] button.
3.   Establish infrared communication.
4.   The successful transfer is confirmed in the MU display.

The individual values can be changed or displayed now via "....table" → "Modify table" (see also item 4.5.3).

3. FCS

The option "FCS" compares the checksums of the tables of the controller and that of the MU-705.

1. Select menu item.
2. Establish infrared communication.
3. Wait till the checksums appear in the display of the MU.

If the data records match, the checksums (FCS) for the MU and the controller are the same and displayed in the MU.

4.6 Menu MU config.

```
                                  1. Language
                                  2. PowerDownTime
  5. MU config.                   3. Keyboard Delay
                                  4. Backlight
                                  5. Infrared
```

4.6.1 Language

Selection menu for the interface language of the MU-705.

You can select using the arrow keys or directly select the number keys 1 – 4.

Select the desired language button for accepting a language setting.

4.6.2 PowerDownTime

Set the switch-off time of the MU in this menu.

Select the setting between 2 and 40 minutes in 2-minute steps using the arrow keys and confirm with [Enter].

If there is no activity during the configured time, the MU switches off automatically.

4.6.3 Keyboard Delay

The button delay can be configured via this menu.

Select the setting between 500 and 900ms in 50ms-steps using the arrow keys and confirm with [Enter].

4.6.4 Backlight

Select the settings for the background illumination of the display here.

      ( ) Auto   switches off the background illumination in case of inactivity

      ( ) On   Background illumination always on

      ( ) Off   Background illumination always off (energy saving)

Select the setting using the arrow keys and confirm with [Enter].

4.6.5 Infrared

Only MU-705 (WNR CWA-60060967)

In this menu, the transmission speed for infrared communication is set.
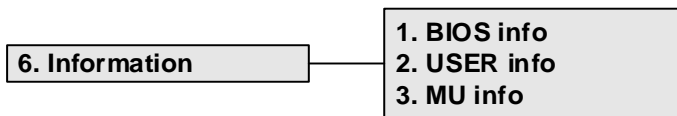The selection is made with the function keys F1 and F3 keys.

        F1 [IR]   Slow infrared (9600 bit/s)
        F3 [IRDA]   Fast infrared (62500 bit/s)

The setting is accepted when you exit the menu.

Menu Information

The information menu contains general details like version numbers, used software versions etc.

6. Information	→	1. BIOS info 2. USER info 3. MU info

4.6.6 BIOS info

Reads the plant number and serial number of the controller.

1. Select menu item.
2. Establish infrared communication.
3. Wait till the information appears in the display of the MU.

4.6.7 USER info

Reads the version of the USER-software of the controller.

1. Select menu item.
2. Establish infrared communication.
3. Wait till the information appears in the display of the MU.

4.6.8 MU info

Displays information about the MU and general information.

More information can be called by pressing the function keys F1 – F3.

F1   Display of start screen
F2   Conductix-Wampfler Automation GmbH - Contacts
F3   Size and type of the internal flash memory

4.7 Menu Program files

This menu manages the programs and access rights stored in the MU.

7. Program files	**1. Prog. manager** **2. Password** **3. Memory**
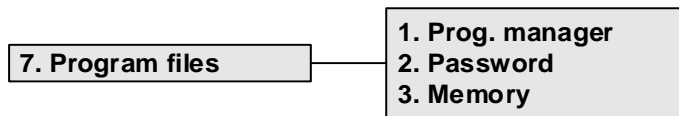
4.7.1 Prog. manager

The Program Manager is used to download programs (software update of vehicle controllers).

> **Note!**
> *A password provided by* Conductix-Wampfler Automation GmbH *is required to download the user software.*

1. Enter the required download-keyword as described under point 4.8.2.

2. Select Program Manager.

3. Select .hex- File using the arrow keys.

4. Establish infrared communication.

5. Transfer selected .hex file using the F1 button [Download]. A progress display is visible in the MU display during the download. An active download is displayed by "**S - - -**" in the controller display.

   → Please ensure that the IR transmitter of the MU is directed towards the display of the vehicle controller.

6. The successful programming is confirmed by the display of "**PEnd**" in the controller.

7. Finally, switch off and then switch on the vehicle controller. The vehicle is ready for operation again. If an incompatible software is downloaded, the vehicle controller reports this - after it is switched on - by displaying "**U - - -**".

> *The operating manual of the MU-705 Utility contains detailed information about downloading of the USER-software into the MU.*

4.7.2 Password

The access rights for special functions, like e.g. program download is assigned through this menu.

Input a password for this.
The rights are enabled so long as the switched-on state of the MU continues.

Input password

1. Select menu item.
2. Input the keyword via the keypad.
3. Confirm input by pressing F1 [Set].
4. The release is confirmed by the information "Access full".

4.7.3 Memory

Displays the information about the program memory of the MU.
Press the key F3 [Delete] to delete all the files (.h86 .hex) stored in the MU.

4.8 Menu Accessories

8. Accessories	1. Timer 2. Calculator 3. Applications

4.8.1 Timer

The MU-705 contains a stop clock with four time measurements.

F1 [Start]   Start, new start of the four time measurements simultaneously

F2 [Reset]   resets the four measurements

F3 [Stop]   stops the four time measurements

> **Note!**
> *Every stop clock can also be started, newly started and stopped individually.*
> *You can do this by pressing the relevant key 1 – 4.*

4.8.2 Calculator

Starts the pocket calculator function of the MU.

F1   Select the calculator operation.

F2   Input/output mode, switch between decimal/hexa-decimal (active mode is displayed in the result field). Press the corresponding alphabet key (multiple short presses) to call the letters for inputting hexadecimal characters.

F3   Undo input.

4.8.3 Applications

This menu contains optional applications like e.g. games.

4.9 Menu Identification (only ST-8xx)

9. Identification	1. R L Parameter 2. Controller Params 3. Angle
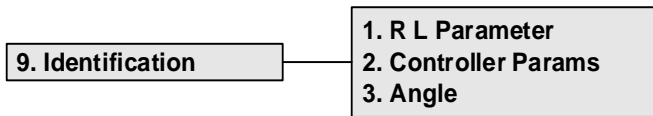
4.9.1 R L Parameter

This menu item is used for enabling automatic recognition of the stator resistance and the stator inductance of a motor that is connected to the control.

Caution!
This menu item is used to change important control settings. For information on the settings, please refer to the separate description of the control used.

Automatic recognition of the motor parameters:

1. Select menu item.
2. Establish infrared communication.
3. Wait until the parameters have been recognised.
   The amount of changed car parameters appears in the MU display.

View and import modified motor parameters:

1. Press F3 [View] → The modified parameters are displayed.

   Use the arrow keys to display the single, modified parameters.
   The parameter name, the set value and the unit are displayed in the upper part of the display.
   The parameter description is displayed in the bottom part. You also get an indication of the amount of parameters in the table (e.g. 14/53).

2. Press F1 [Write].
3. Establish infrared communication.
4. The modified parameters are imported into the MU and transmitted to the control.
5. The successful transmission is confirmed in the MU display.

Note!
If you do not want to import the data, you can interrupt the process by pressing the ESC key.

4.9.2 Controller Params

This menu item is used to automatically adjust the control parameters for the drive system.

> **Caution!**
>
> *This menu item is used to change important control settings. For information on the settings, please refer to the separate description of the control used.*

Automatic adjustment of the control parameters:

1. Select menu item.
2. Establish infrared connection.
3. Wait until the parameters have been adjusted.
    The amount of changed car parameters appears in the MU display.

View and import modified control parameters:

1. Press F3 [View] → The modified parameters are displayed.

    Use the arrow keys to display the single, modified parameters.
    The parameter name, the set value and the unit are displayed in the upper part of the display.
    The parameter description is displayed in the bottom part. You also get an indication of the amount of parameters in the table (e.g. 14/53).

2. Press F1 [Write].
3. Establish infrared communication.
4. The modified parameters are imported into the MU and transmitted to the control.
5. The successful transmission is confirmed in the MU display.

> **Note!**
>
> *If you do not want to import the data, you can interrupt the process by pressing the ESC key.*

4.9.3 Angle

This menu item is used to automatically recognise an angle offset between the motor encoder and the rotor position, to read it out from a control and to write it in a control.

Caution!

This menu item is used to change important control settings. For information on the settings, please refer to the separate description of the control used.

Automatic recognition of the angle offset:

1. Select menu item.
2. Press F2 [Auto adjust].
3. Establish infrared communication.
4. Wait until angle offset has been recognised automatically.
    Angle offset appears in the MU display.

Read out angle offset manually:

1. Select menu item.
2. Press F1 [Read].
3. Establish infrared communication.
4. Wait until angle offset has been read out.
    Angle appears in the MU display.

Write angle offset:

1. Check recognised angle offset automatically or enter new angle offset using the keyboard
    (three-digit, 0…359, replace unused digits by '0').
2. Press F3 [Write].
3. Establish infrared communication.
4. Angle is written to the control.

5 Technical information

5.1 Data sheet

General

Type	MU-705	MU-705	MU-705 TF
Item number	3233528	3226594	3226595
WNR	CWA-60060967	CWA-60060968	CWA-60060969
Housing	impact-resistant plastic		
Colour	green-blue as per RAL 5020		
Dimensions H x W x D	230 mm x 97 mm x 58 mm		
Weight	460 g		
IP protection class	IP 30		
Display	LCD resolution 128 x 64		
Operation buttons	18		

Electrical data

Supply voltage	Battery (rechargeable) 4.8 V NiMH / 2000 mAh
Average power consumption	approx. 160 mA

Data transmission

Infrared type	IR / IRDA standard	IRDA standard	IRDA standard
Transmission rate	9600 / 62500 bit/s	62500 bit/s	62500 bit/s
Range	1 m		
Angle of reflected beam	± 16°		

Ambient conditions

Operating temperature	+ 10 °C to + 50 °C		
Storage temperature	- 10 °C to + 50 °C		
Relative humidity	< 80% non-condensing		
tropicalized	-	-	✔

User sets

Type	Set MU-705	Set MU-705	Set MU-705 TF
Item number	3233721	3223944	3224633
WNR	CWA-60760967	CWA-60060888	CWA-60608101
Content	1 x MU-705 (3233528)	1 x MU-705 (3226594)	1 x MU-705 TF (3226595)
	1 x battery pack		
	1 x battery charger extension		
	1 x plug-in battery charger with adaptors		
	1 x USB cable		

5.2 Device drawing