



OPERATING INSTRUCTIONS

MATCH Comfort App

for Denso robots

DDOC01256

THE KNOW-HOW FACTORY

MATCH

Content

- 1 Supporting documents 4
 - 1.1 Notices and graphics in the installation and operating instructions4
- 2 Proper use 5
- 3 Personnel qualification 5
- 4 Product description 6
- 5 Functional description 6
- 6 Accessories/scope of delivery 6
- 7 Installation 7
 - 7.1 Installing the MATCH Comfort App.....7
- 8 Commissioning 8
 - 8.1 Existing setup found8
 - 8.2 Creating a gripper configuration 9
 - 8.2.1 Selecting the connection type.....9
 - 8.2.2 Gripper connection type9
 - 8.2.3 MATCH connection type15
- 9 Operation..... 19
 - 9.1 Control principle of the gripper19
 - 9.2 Overview of generated robot jobs19
- 10 Error diagnosis21

1 Supporting documents

NOTICE



Read through the installation and operating instructions before installing or working with the product.

The installation and operating instructions contain important notes for your personal safety. They must be read and understood by all persons who work with or handle the product during any phase of the product lifetime.



The documents listed below are available for download on our website www.zimmer-group.com.

- Installation and operating instructions
 - Catalogs, drawings, CAD data, performance data
 - Information on accessories
 - Technical data sheets
 - General Terms and Conditions, including warranty information.
- ⇒ Only those documents currently available on the website are valid.

In these installation and operating instructions, "product" refers to the product designation on the title page!

1.1 Notices and graphics in the installation and operating instructions

DANGER



This notice warns of an imminent danger to the life and health of people. Ignoring these notices can lead to serious injury or even death.

- ▶ You absolutely must comply with the described measures for avoiding these dangers!
- ⇒ The warning symbols are assigned according to the type of danger.

WARNING



This notice warns of a situation that is potentially hazardous to personal health. Ignoring these notices can cause serious injury or damage to health.

- ▶ You absolutely must comply with the described measures for avoiding these dangers!
- ⇒ The warning symbols are assigned according to the type of danger.

CAUTION



This notice warns of a situation that is potentially hazardous for people or that may result in material or environmental damage. Ignoring these notices may result in slight, temporary injuries or damage to the product or to the environment.

- ▶ You absolutely must comply with the described measures for avoiding these dangers!
- ⇒ The warning symbols are assigned according to the type of danger.

NOTICE



General notices contain usage tips and valuable information, but no warnings of dangers to health.

INFORMATION



This category contains useful tips for handling the product efficiently. Failure to observe these tips will not result in damage to the product. This information does not include any information relevant to health or workplace safety.

2 Proper use

NOTICE



The product is only to be used in its original state with its original accessories, with no unauthorized changes and within the stipulated parameter limits and operating conditions.

Any other or secondary use is deemed improper.

- ▶ Operate the product only in compliance with the associated installation and operating instructions.
- ▶ Operate the product only when it is in a technical condition that corresponds to the guaranteed parameters and operating conditions.
- ⇒ Zimmer GmbH shall accept no liability for any damage caused by improper use. The operator bears sole responsibility.

The product is intended for installation and operation on the robot control panel *Denso IPC Control Unit* of the *RC8A* robot control system.

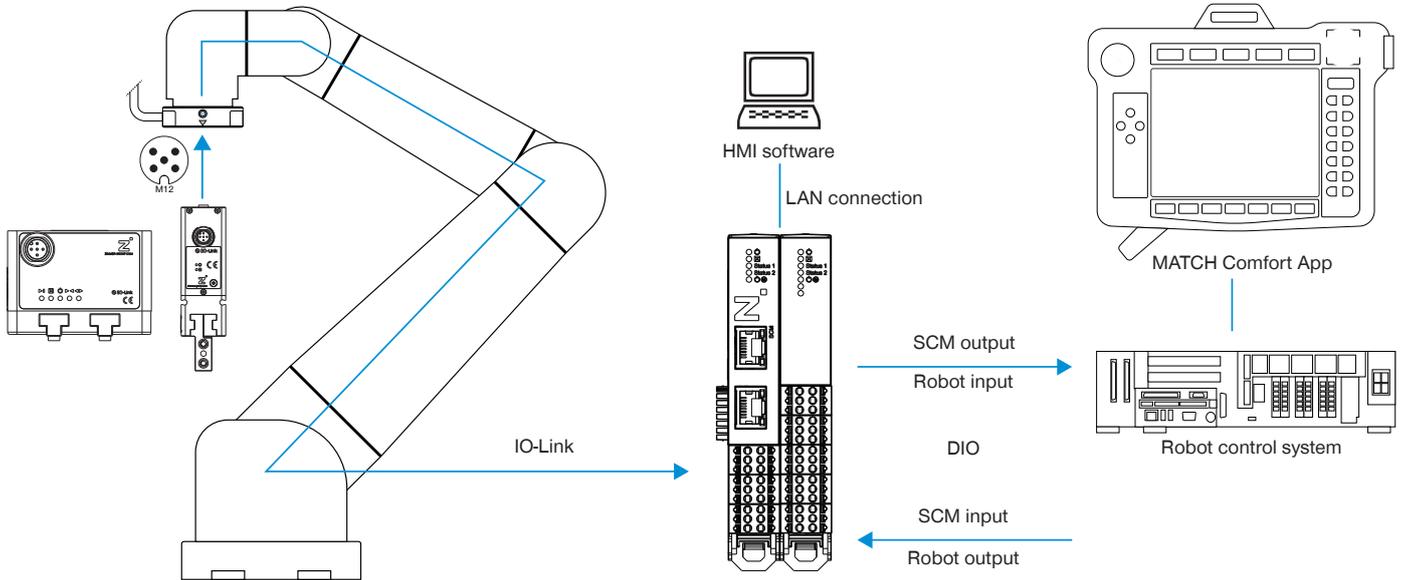
3 Personnel qualification

Installation, commissioning and maintenance may only be performed by trained specialists. These persons must have read and understood the installation and operating instructions in full.

4 Product description

The Smart Communication Module (SCM) is a gateway between the grippers and the robot control system. The SCM can be configured via the HMI software or MATCH Comfort App. The grippers can be controlled using the MATCH Comfort App on the robot control panel.

The image shows a simplified view of the structure of the overall system. All parts for the electrical connection of a gripper with the robot are included or are available from Zimmer GmbH as optional accessories.



5 Functional description

The MATCH Comfort App is used on the robot control panel to control grippers.

Depending on the configuration and the connection used, various robot jobs are available for interacting between robot inputs and robot outputs with the gripper.

The names of the dynamically generated robot jobs remain unchanged. The basic program does not have to be modified for configuration changes or redistribution of the robot inputs and robot outputs.

6 Accessories/scope of delivery

INFORMATION



If any accessories not sold or authorized by Zimmer GmbH are used, the function of the product cannot be guaranteed. Zimmer GmbH accessories are specifically tailored to the individual products.

► For optional accessories and those included in the scope of delivery, refer to our website.

7 Installation

7.1 Installing the MATCH Comfort App

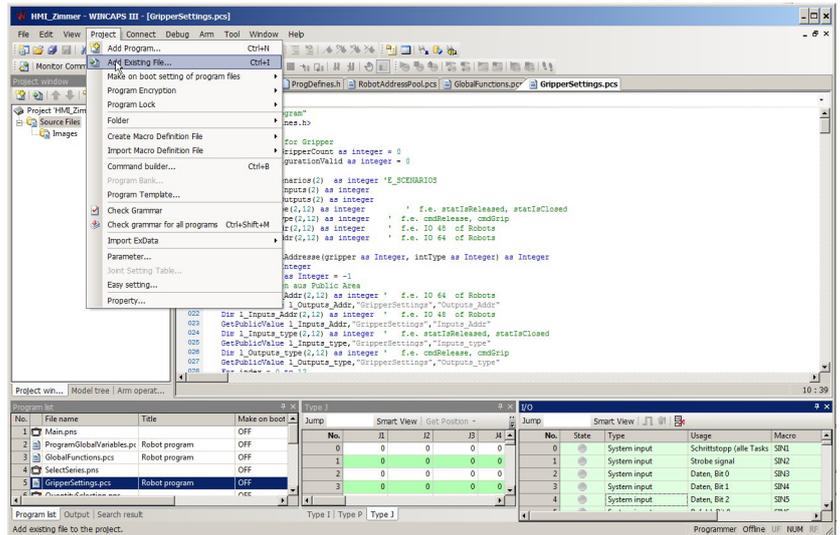
INFORMATION



The MATCH Comfort App consists of two main parts:

- *ZimmerComfortApp.pns*: main screen for entering mapping mode. All control panels, headers and program files for visual address assignment can be used and the gripper settings can be stored for use.
- *GripperSettings.pcs*: gripper settings for use.

- ▶ Open your WINCAPSIII robot application project.
- ▶ In the menu bar, click *Project*.
 - ▶ Click *Add Existing File*.
- ▶ Select the desired project source file in the folder *//Setup Source Files*:
 - Header file (*.h)
 - *ZimmerComfortApp.pns*
 - *GripperSettings.pcs*



The MATCH Comfort App uses public variables of the robot control system.

- ▶ Initialize the public variables of the robot control system.
- ▶ Execute the call *ZG_ComfortApp_Initialize()* in automatic mode.



8 Commissioning

NOTICE



► Switch on the robot so that you can use the MATCH comfort App.

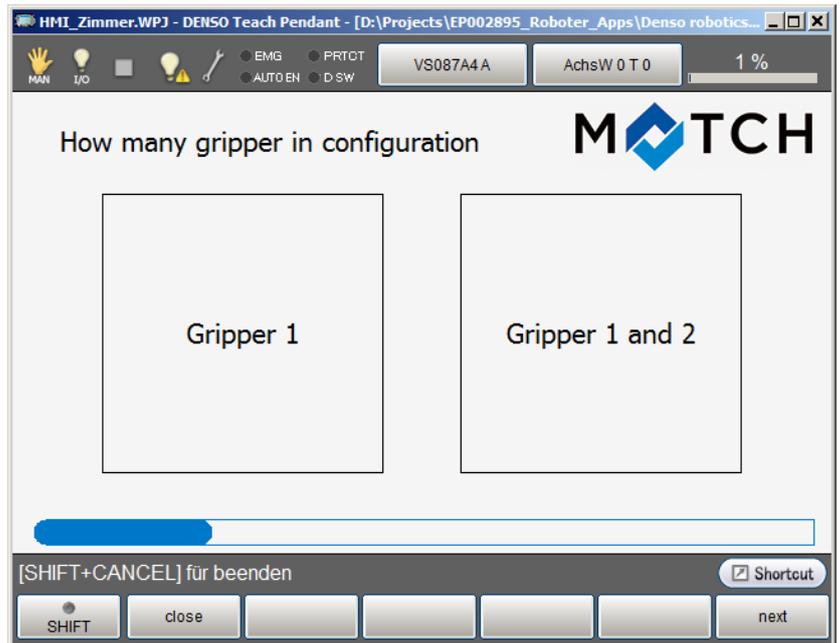
8.1 Existing setup found

The following screen is displayed only if an existing setup is found for two grippers.

This screen does not appear if the available setup is only found for one gripper. In this case, the next screen is shown right away.

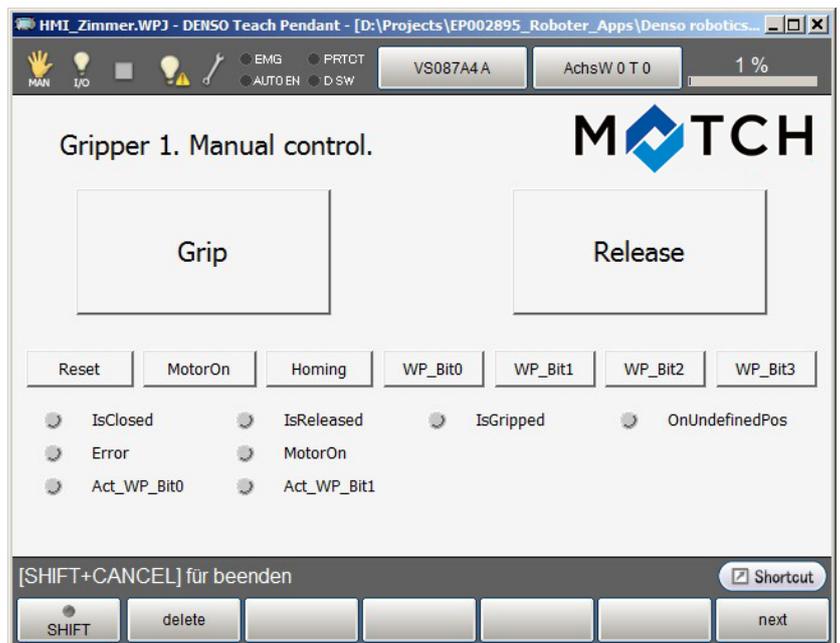
► Click the button of the desired gripper.

⇒ The *Manual control* screen for the manual control is displayed.



In the *Manual control* screen, you can operate the gripper manually and display the status.

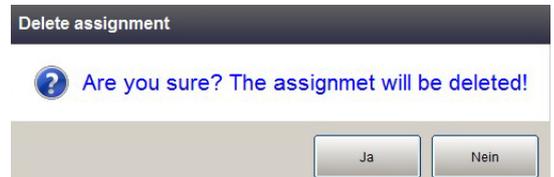
► Click the *delete* button.



► In the prompt, click the *YES* button.

⇒ The existing setup is deleted.

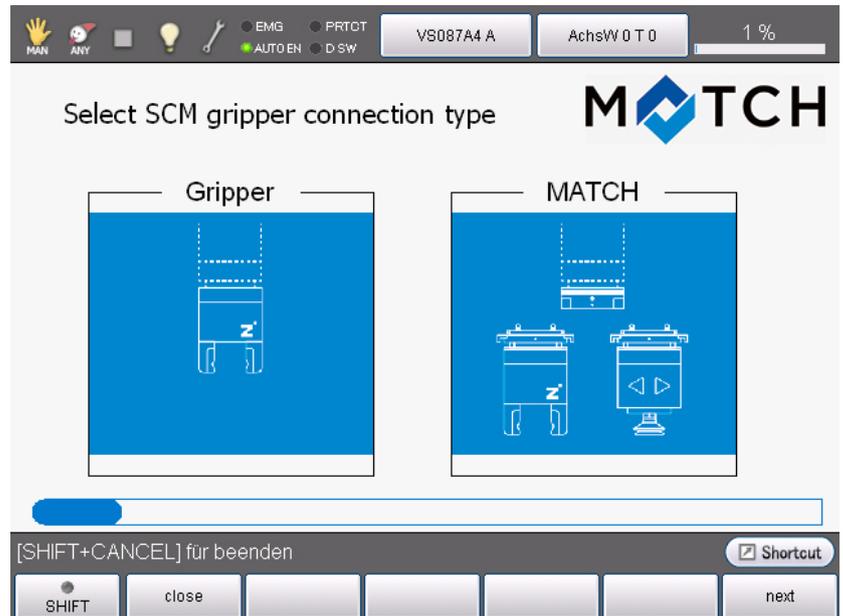
⇒ The screen sequence for configuring new grippers is displayed.



8.2 Creating a gripper configuration

8.2.1 Selecting the connection type

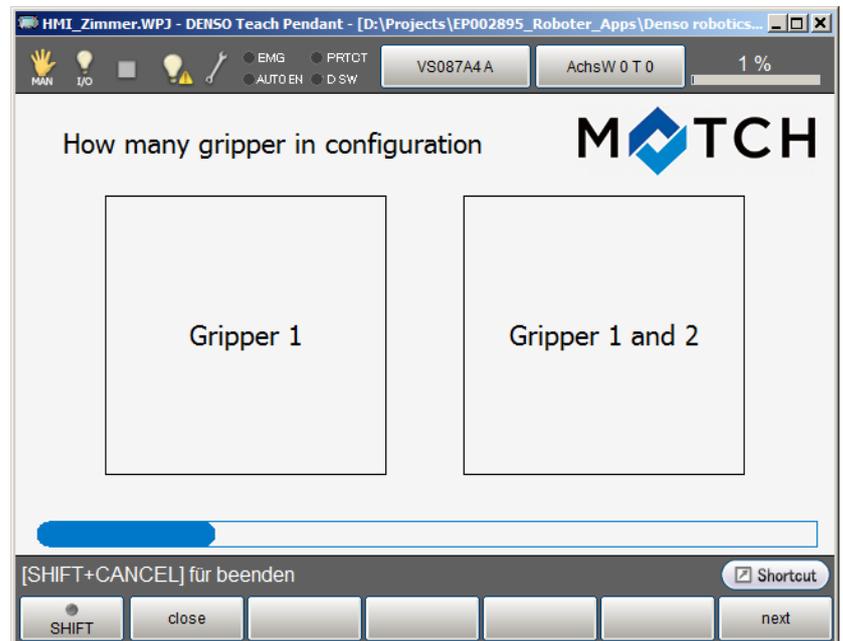
- ▶ Click *Gripper* if you have connected a gripper.
- ▶ Click *MATCH* if you have connected a MATCH gripper.
- ▶ Click the *next* button.



8.2.2 Gripper connection type

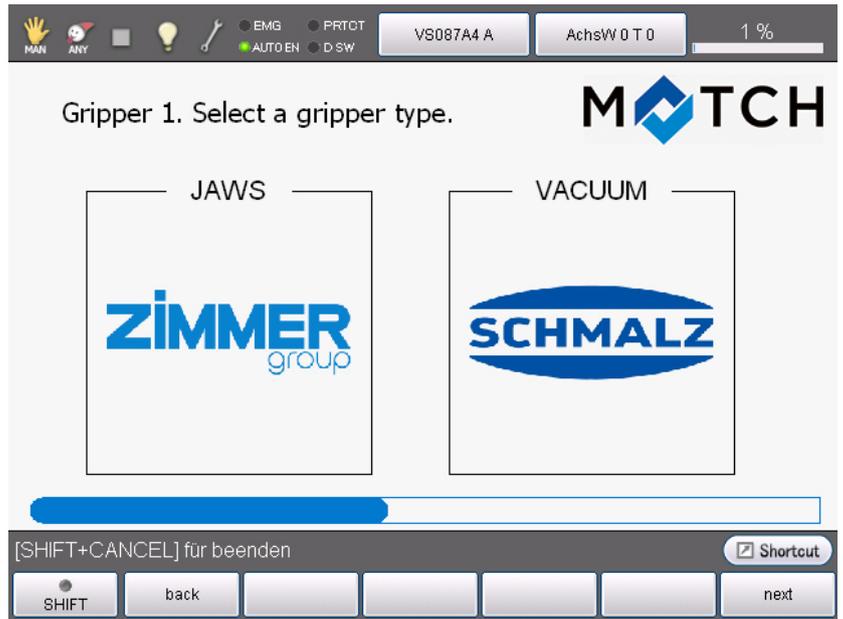
8.2.2.1 Selecting the number of grippers

- ▶ Click the desired number of grippers you want to have in your robot application.
- ▶ Click the *next* button.



8.2.2.2 Selecting the gripper type

- ▶ Click the desired gripper type.
- ▶ Click the *next* button.



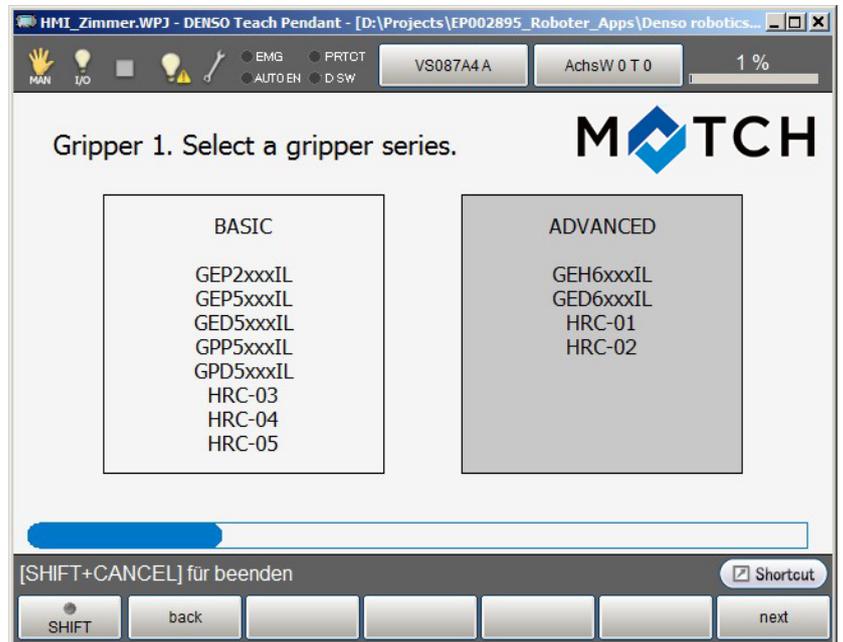
8.2.2.3 Selecting the gripper series

INFORMATION



Basic and *Advanced* designate different classes of grippers from Zimmer GmbH.

- ▶ Click the class of your gripper.
- ▶ Click the *next* button.



8.2.2.4 Manual control

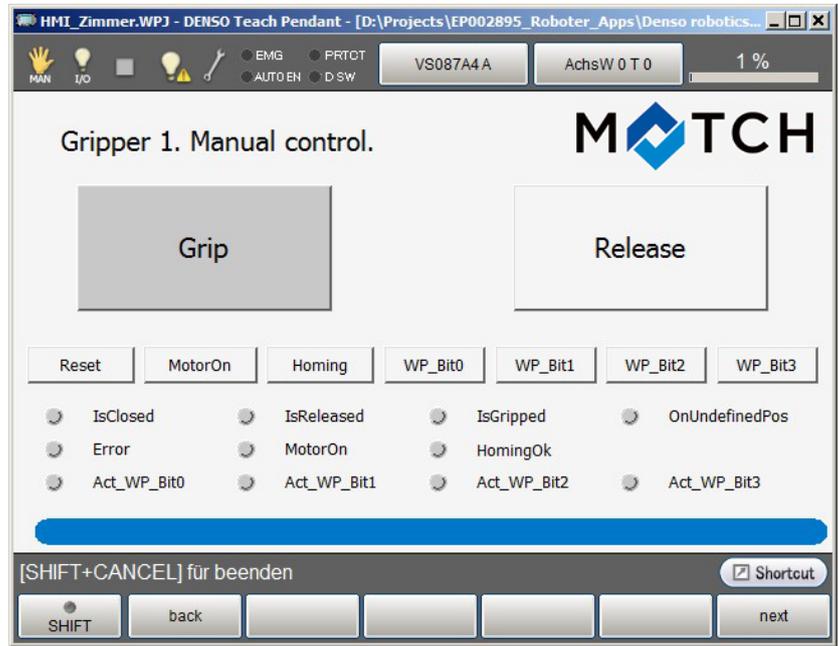
NOTICE



The prerequisite for the function test is that the wiring between the robot and SCM is present and that the robot, SCM and gripper are switched on.

You can test and operate the function of the gripper and view its status in the lower area of the screen.

- ▶ Click the *Customizing IOs* button.
- ⇒ The *Select command connection* screen for selecting the command connections is displayed.



8.2.2.5 Selecting the command connections

NOTICE



The gripper wiring must match the gripper configuration done in the MATCH Comfort App.

NOTICE



If this screen is displayed for the first time, a standard assignment is displayed.

▶ Complete the wiring precisely as shown on this screen.

To reset the values to the defaults, edit the values or return to the selection of the number of grippers (see the section "Selecting the number of grippers").

▶ Establish the correspondence of the robot output number with the digital input function of the SCM.

You can accept the default assignment or change it.

▶ Click the *next* button if you want to keep the default assignment.

Editing the command connection

▶ Click the button of the desired signal.

- e.g. Release

▶ Click the desired output.

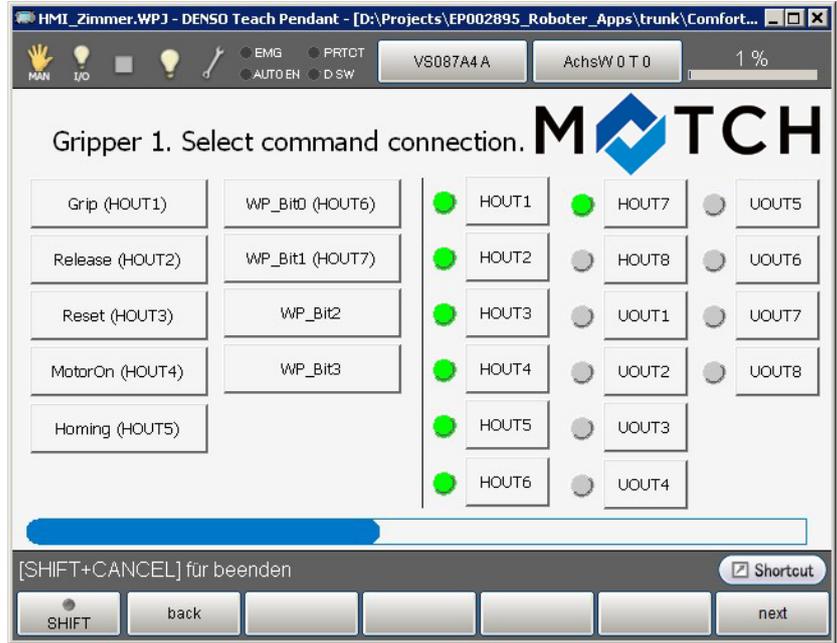
- e.g. HOUT7

⇒ The output has been assigned to the signal.

⇒ The button of the signal is expanded by adding the output.

- e.g. Release (HOUT7)

▶ Click the *next* button.



▶ In the prompt, click the *YES* button.

⇒ The *Select status connections* screen for status connections is displayed.

Default assignment

Do you accept default assignment?



8.2.2.6 Selecting the status connections

- ▶ Establish the correspondence of the robot input number with the digital input function of the SCM.

NOTICE



If this screen is displayed for the first time, a standard assignment is displayed.

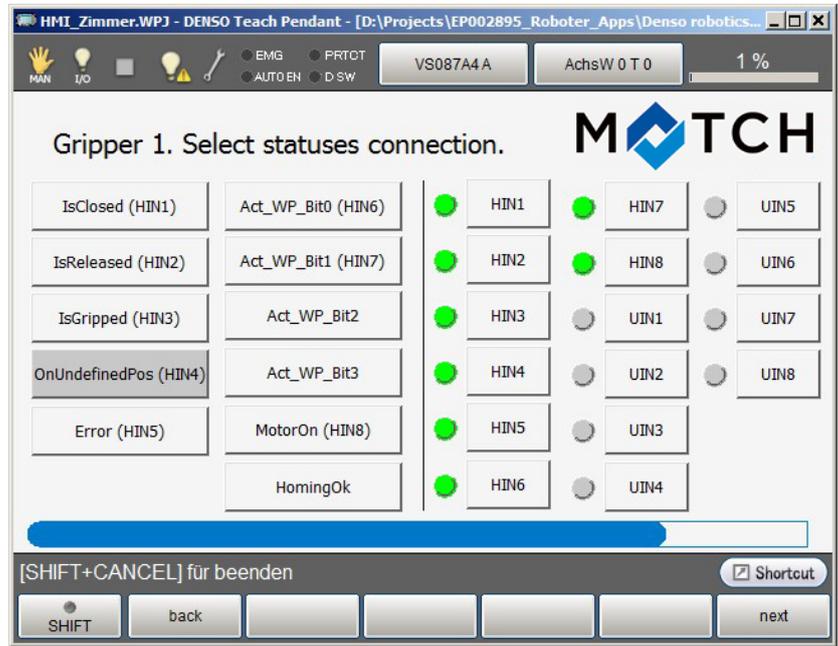
- ▶ Complete the wiring precisely as shown on this screen.

You can accept the default assignment or change it.

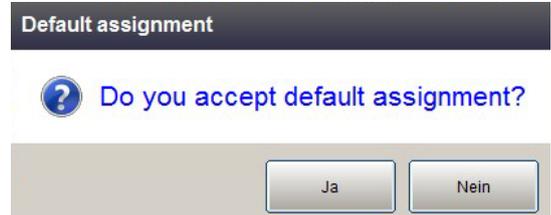
- ▶ Click the *next* button if you want to keep the default assignment.

Editing the command connection

- ▶ Click the button of the desired signal.
 - e.g. Release
- ▶ Click the desired output.
 - e.g. HOUT7
- ⇒ The output has been assigned to the signal.
- ⇒ The button of the signal is expanded by adding the output.
 - e.g. Release (HOUT7)
- ▶ Click the *next* button.

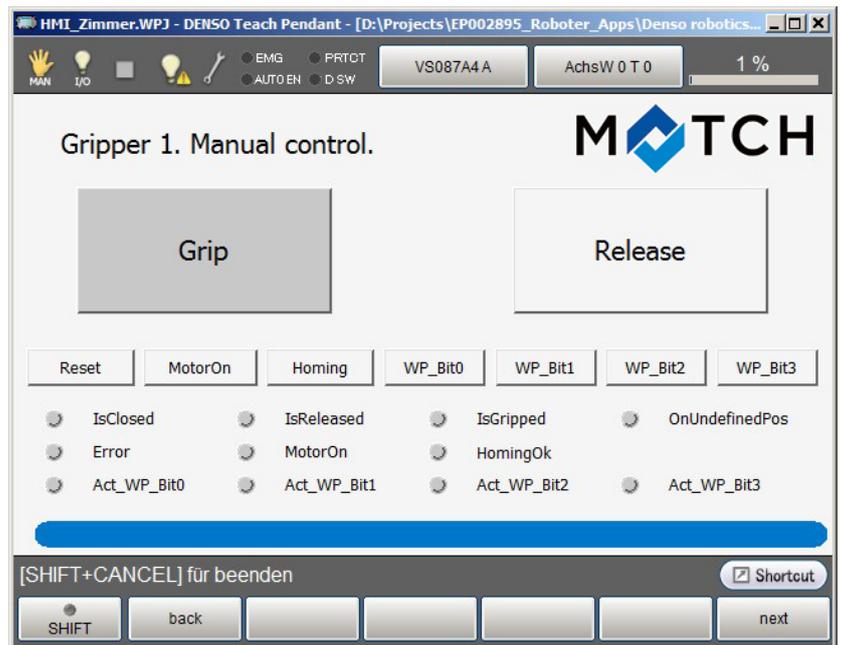


- ▶ In the prompt, click the YES button.



8.2.2.7 Storing gripper configuration

- ⇒ The *Manual control* screen for the manual control is displayed.
- ▶ For more information, refer to the section "Manual control".
- ▶ Click the *next* button.
- ⇒ The gripper configuration is complete.
- ⇒ The function blocks/subprograms have been created and are available for programming.



8.2.3 MATCH connection type

8.2.3.1 Manual control

NOTICE



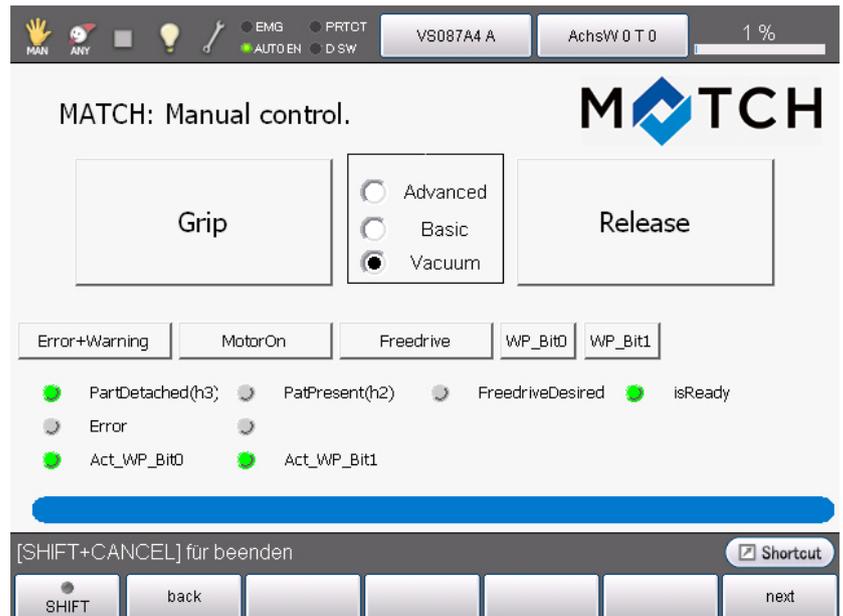
The prerequisite for the function test is that the wiring between the robot and SCM is present and that the robot, SCM and gripper are switched on.

You can test and operate the function of the gripper and view its status in the lower area of the screen.

You can use the checkboxes to choose between the grippers.

► Click the *Customizing IOs* button.

⇒ The *Select command connection* screen for selecting the command connections is displayed.



8.2.3.2 Selecting the command connections

NOTICE



If this screen is displayed for the first time, a standard assignment is displayed.

▶ Complete the wiring precisely as shown on this screen.

To reset the values to the defaults, edit the values or return to the selection of the number of grippers (see the section "Selecting the number of grippers").

▶ Establish the correspondence of the robot output number with the digital input function of the SCM.

You can accept the default assignment or change it.

▶ Click the *next* button if you want to keep the default assignment.

Editing the command connection

▶ Click the button of the desired signal.

- e.g. Release

▶ Click the desired output.

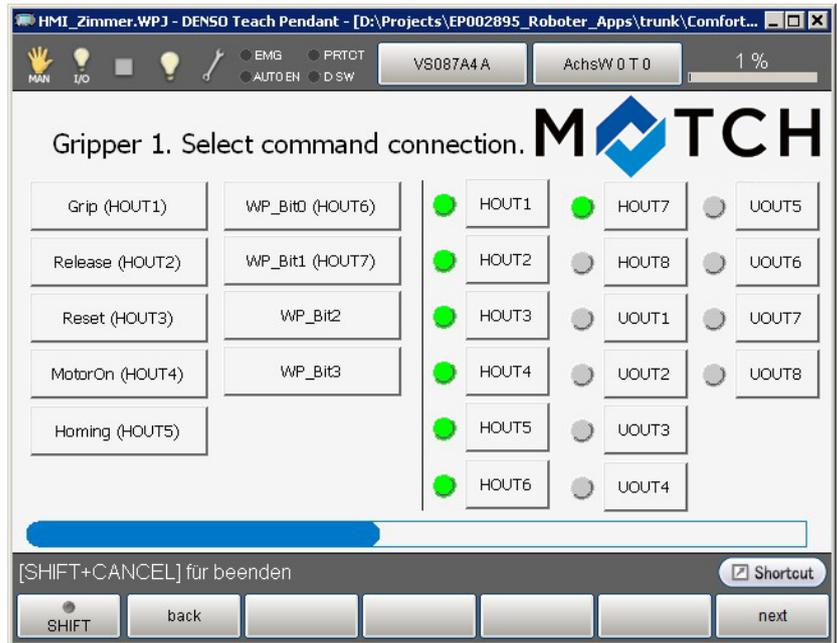
- e.g. HOUT7

⇒ The output has been assigned to the signal.

⇒ The button of the signal is expanded by adding the output.

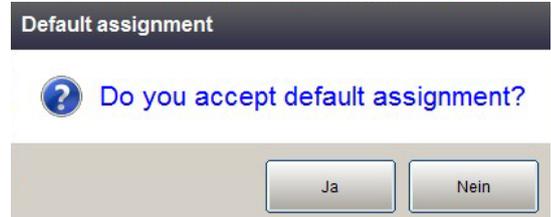
- e.g. Release (HOUT7)

▶ Click the *next* button.



▶ In the prompt, click the *YES* button.

⇒ The *Select status connections* screen for status connections is displayed.



8.2.3.3 Selecting the status connections

- ▶ Establish the correspondence of the robot input number with the digital input function of the SCM.

NOTICE



If this screen is displayed for the first time, a standard assignment is displayed.

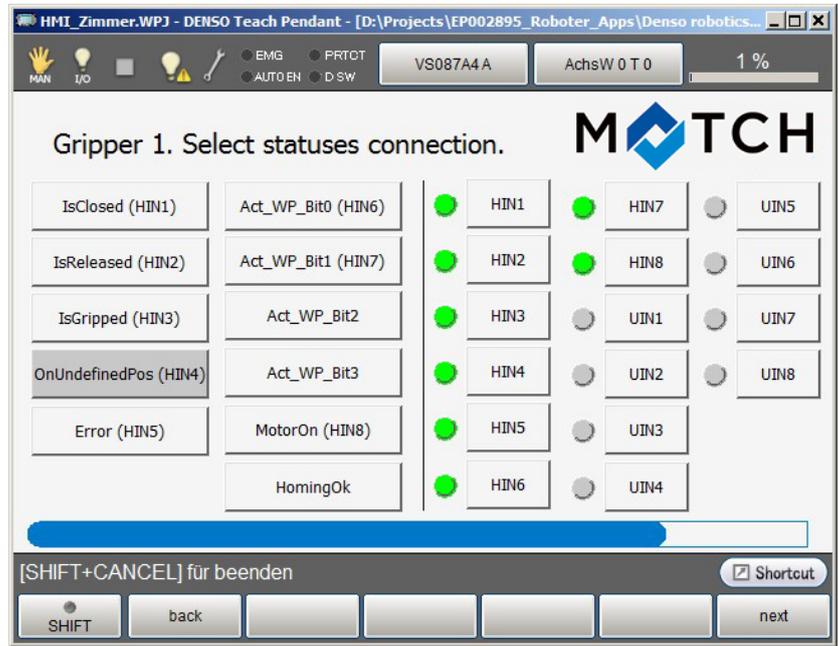
- ▶ Complete the wiring precisely as shown on this screen.

You can accept the default assignment or change it.

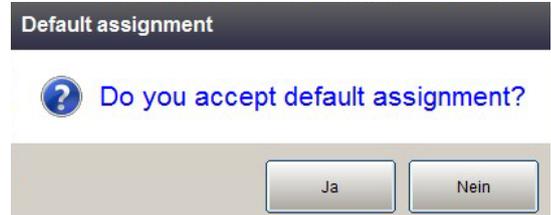
- ▶ Click the *next* button if you want to keep the default assignment.

Editing the command connection

- ▶ Click the button of the desired signal.
 - e.g. Release
- ▶ Click the desired output.
 - e.g. HOUT7
- ⇒ The output has been assigned to the signal.
- ⇒ The button of the signal is expanded by adding the output.
 - e.g. Release (HOUT7)
- ▶ Click the *next* button.

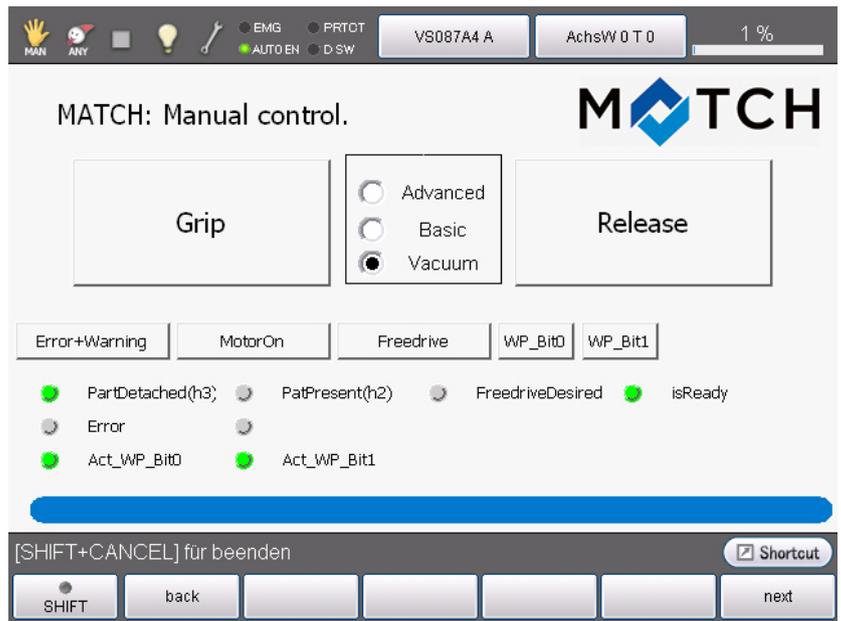


- ▶ In the prompt, click the YES button.



8.2.3.4 Storing gripper configuration

- ⇒ The *Manual control* screen for the manual control is displayed.
- ▶ For more information, refer to the section "Manual control".
- ▶ Click the *next* button.
- ⇒ The gripper configuration is complete.
- ⇒ The function blocks/subprograms have been created and are available for programming.



9 Operation

9.1 Control principle of the gripper

- ▶ Prepare *Advanced* grippers for the control system:
 - ▶ If necessary, do a reference run (Z_Homing).
 - ▶ Check if the reference run was done (Z_IsHomingOk or Z_IsHomingSuccess).
 - ▶ Switch on the motor (Z_MotorOn).
 - ▶ Check whether the motor is switched on (Z_IsMotorOn).
 ⇒ The gripper is prepared for the control system if no error is present (Z_IsError).
- ▶ Set a workpiece configured with the HMI software ZG_IO_LINK_HMI (Z_ChangeWP(number)) if more than one workpiece is used.
- ▶ Check whether a workpiece has changed (Z_IsWpChanged(number)).
- ▶ Grip (Z_Grip) or release (Z_Release) the workpiece.
- ▶ Check the position of the gripper jaw (Z_IsOnTeachPos, Z_IsOpened, Z_IsClosed or Z_IsOnUndefPos).

9.2 Overview of generated robot jobs

After successful configuration of the grippers using the HMI software ZG_IO_LINK_HMI, robot jobs for various functions are generated in the robot control panel. The robot jobs can be called up from user jobs. The following robot jobs can be created using the MATCH Comfort App.

Not all robot jobs are generated after successful configuration of the grippers. The job is created only if the corresponding command or status is wired and used by the equipped gripper(s).

Generated robot job name	Parameter In	Parameter Out	Function
ZGRIP1 ZGRIP2	1: Address gripper 1 2: Address gripper 2	<i>bCmdFail</i> = TRUE, if command fails = FALSE, if command was successful	Gripping
ZRELEASE1 ZRELEASE2	1: Address gripper 1 2: Address gripper 2	<i>bCmdFail</i> = TRUE, if command fails = FALSE, if command was successful	Release
ZMOTORON1 ZMOTORON2	1: Address gripper 1 2: Address gripper 2	<i>bCmdFail</i> = TRUE, if command fails = FALSE, if command was successful	Switch on motor for <i>Advanced</i> grippers.
ZMOTOROFF1 ZMOTOROFF2	1: Address gripper 1 2: Address gripper 2	<i>bCmdFail</i> = TRUE, if command fails = FALSE, if command was successful	Switch off motor if gripper is present.
ZHOMING1 ZHOMING2	1: Address gripper 1 2: Address gripper 2	<i>bCmdFail</i> = TRUE, if command fails = FALSE, if command was successful	Perform reference run for <i>Advanced</i> grippers.
ZRESET1 ZRESET2	1: Address gripper 1 2: Address gripper 2	<i>bCmdFail</i> = TRUE, if command fails = FALSE, if command was successful	Reset if gripper is present.
ZCHANGEWP1 ZCHANGEWP2	<i>WpNumber</i> = workpiece number (1 to 15)	<i>bCmdFail</i> = TRUE, if command fails = FALSE, if command was successful	Set workpiece number (n) for use with SCM.
ZISWPCHANGED1 ZISWPCHANGED2	<i>WpNumber</i> = workpiece number (1 to 15)	<i>bWpchanged</i> = TRUE, if workpiece is active = FALSE, if workpiece is not active <i>bCmdFail</i> = TRUE, if command fails = FALSE, if command was successful	Outputs TRUE if workpiece number (n) is activated.

Generated robot job name	Parameter In	Parameter Out	Function
ZISOPENED1 ZISOPENED2	1: Address gripper 1 2: Address gripper 2	<i>bOpened</i> = <i>TRUE</i> , if gripper is open = <i>FALSE</i> , if gripper is closed <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	Outputs <i>TRUE</i> if the gripper is open.
ZISCLOSED1 ZISCLOSED2	1: Address gripper 1 2: Address gripper 2	<i>bClosed</i> = <i>TRUE</i> , if gripper is open = <i>FALSE</i> , if gripper is closed <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	Outputs <i>TRUE</i> if the gripper is closed.
ZISONTEACHPOS1 ZISONTEACHPOS2	1: Address gripper 1 2: Address gripper 2	<i>blsOnTeachPos</i> = <i>TRUE</i> , if gripper is set to TeachPosition = <i>FALSE</i> , if gripper is not set to TeachPosition <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	Outputs <i>TRUE</i> if the gripper is set to <i>TeachPosition</i> .
ZISONUNDEFPOS1 ZISONUNDEFPOS2	1: Address gripper 1 2: Address gripper 2	<i>bUndefPos</i> = <i>TRUE</i> , if gripper is set to UndefinedPosition = <i>FALSE</i> , if gripper is not set to UndefinedPosition <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	Outputs <i>TRUE</i> if the gripper is set to <i>OnUndefinedPos</i> .
ZISERROR1 ZISERROR2	1: Address gripper 1 2: Address gripper 2	<i>bError</i> = <i>TRUE</i> , if gripper is in error state = <i>FALSE</i> , if gripper is not in error state <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	Outputs <i>TRUE</i> if the gripper is in an error state.
ZISMOTORON1 ZISMOTORON2	1: Address gripper 1 2: Address gripper 2	<i>bMotorOn</i> = <i>TRUE</i> , if motor is on = <i>FALSE</i> , if motor is off <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	Outputs <i>TRUE</i> if the motor of the gripper is switched on.
ZISHOMINGOK1 ZISHOMINGOK2	1: Address gripper 1 2: Address gripper 2	<i>bHomeOk</i> = <i>TRUE</i> , if homing is OK = <i>FALSE</i> , if homing is not OK <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	Outputs <i>TRUE</i> if the referencing of the gripper is OK.

Generated robot job name	Parameter In	Parameter Out	Function
ZISHOMINGSUCCESS1 ZISHOMINGSUCCESS2	1: Address gripper 1 2: Address gripper 2	<i>bHomeSuccess</i> = <i>TRUE</i> , if ZHOMING command was successful = <i>FALSE</i> , if gripper is not in error state at ZHOMING command <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	Outputs <i>TRUE</i> if the referencing of the gripper is successful.
ZERRORWARNINGON1 ZERRORWARNINGON2	1: Address gripper 1 2: Address gripper 2	<i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	Enables Error/Warning for robot if gripper is present.
ZERRORWARNINGOFF1 ZERRORWARNINGOFF2	1: Address gripper 1 2: Address gripper 2	<i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	Disables Error/Warning for robot if gripper present.
ZISPARTDETACHED1 ZISPARTDETACHED2	1: Address gripper 1 2: Address gripper 2	<i>bPartDetached</i> = <i>TRUE</i> , if part is detached = <i>FALSE</i> , if part is not detached <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	B[n] = 1, if gripper of gripper type <i>Vacuum</i> signals <i>Part detached</i> . B[n] = 0, if part is not detached.
ZISPARTPRESENT1 ZISPARTPRESENT2	1: Address gripper 1 2: Address gripper 2	<i>bPartPresent</i> = <i>TRUE</i> , if part is present = <i>FALSE</i> , if part is not present <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	B[n] = 1, if gripper of gripper type <i>Vacuum</i> signals <i>Part present</i> . B[n] = 0 if part is not present.
ZISREADY1 ZISREADY2	1: Address gripper 1 2: Address gripper 2	<i>bReady</i> = <i>TRUE</i> , if input is switched on = <i>FALSE</i> , if input is not switched on <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	B[n] = 1 if gripper of gripper type <i>Vacuum</i> signals <i>Ready</i> . B[n] = 0 if gripper is not ready.
ZMATCHSTARTCHANGE1 ZMATCHSTARTCHANGE2	-	<i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	Is output before the gripper is changed for <i>MATCH</i> .
ZISMATCHCHANGEDONE1 ZISMATCHCHANGEDONE2	-	<i>bMatchChangeDone</i> = <i>TRUE</i> , if match was changed = <i>FALSE</i> , if match was not changed <i>bCmdFail</i> = <i>TRUE</i> , if command fails = <i>FALSE</i> , if command was successful	For <i>MATCH</i> B[n] = 1 if gripper is connected successfully. B[n] = 0, if gripper is not connected successfully.

10 Error diagnosis

INFORMATION



- ▶ More information can be found in the installation and operating instructions of the gripper.
- ▶ Please contact Zimmer Customer Service if you have any questions.