



Taktomat indexing controller

Type TICx-xxx-xxx-2-B-0-0

Version 2

Application software V5.00

Translation of
Operating Instructions

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1 Overview / brief description

1.1 General description

TIC stands for Taktomat Indexing Controller

The Taktomat indexing controller TIC Controller consists of the following components:

The TIC Taktomat Indexing Controller consists of the following components:

- Altivar 71 Frequency Converter
- Altivar ATV-IMC Drive Controller with application software
- Graphic display terminal
- With personal safety stop option:
 - XPS-ATE Safety Relay for monitoring emergency stop circuits

The Taktomat indexing controller is a combination of the Altivar 71 Frequency Converter with an integrated Altivar ATV-IMC Drive Controller for machine control. The Taktomat Indexing Controller allows easy control of the rotary table using sensors without the need for an additional PLC.

The XPS-ATE Safety Relay option additionally allows the use of the personal safety stop option.

With this option, performance level "d" is achievable.



Figure 1 Example of the TIC Taktomat indexing controller

The Taktomat Indexing Controller offers you these benefits:

- Cycle time optimisation by stopping the drive at the end of the resting phase.
- Reduced installation and hardware expenditure.
- No need for motor protection switches and mechanical or electronic contactors. Only a power contactor is needed.
- Single phase motor operation (up to 5 kW).
- Fast, gentle braking in the event of an emergency stop for reduced gear wear.
- Soft restart from an intermediate position or after an emergency stop.
- Machine-protecting inching mode.
- Oscillating or reverse rotation direction without additional hardware.
- Easy speed adjustment.
- Short commissioning time, as rotary table software is already integrated in the controller.

2 About these Operating Instructions Operating Instructions

Designation

These Operating Instructions describe the Taktomat indexing controller type TIC. The Taktomat indexing controller type TIC is referred to below as 'Taktomat indexing controller'.

2.1 Purpose of these Operating Instructions

The Operating Instructions are intended to help you to:

- work efficiently
- ensure quality
- find information quickly
- avoid danger

Table of contents

The Operating Instructions have a table of contents at the front. This gives you an overview of all the sections in the document.

Headings and page numbers

The chapters are numbered sequentially. The sections within each chapter are numbered sequentially.

Safety information

Any safety information is placed before the descriptions of actions that may pose a risk. You will find a detailed description of the safety information in the chapter entitled Safety.

Text, symbols, figures

Instructions for performing various activities and other information are presented in small, discrete sections.

The information is presented using a combination of text, symbols and figures.

Instructions for performing action are described in the appropriate sequence and numbered accordingly.

Instructions for action

For the sake of clarity the instructions for action have been broken down into individual steps:

- ▶ Introductory text...
- ⇒ Instruction result

Lists

Any lists which do not include individual operating steps are indicated as follows:

- Lists...
 - Sub-items in lists

Figures

Figures, dimensions and technical data presented in these Operating Instructions may be subject to change.

Cross-references

Cross-references point you to additional descriptions within the Operating Instructions (chapter number/page number).

2.2 Related documents

Read the following documents for the particular hardware supplied before operating the Taktomat indexing controller by following these Operating Instructions.

Designation	Version Revision Datum	Order number
Altivar 61 - Installation Manual	5.0 05 31/03/2011	1760643
Altivar 61 - Programming Manual	6.0 09 26/02/2014	1760649
ATV61 - Communication Parameters Manual	3.0 07 28/02/2013	1760661
Altivar 71 - Programming manual	6.5 09 26/02/2014	1755855

Designation	Version Revision Datum	Order number
ATV71 Quick Start Guide	1.0 00 05/04/2012	S1B86982
ATV71W/E5 Simplified manual	3.0 05 31/05/2011	1760825
ATV71P (Plate) Simplified manual	3.0 05 31/05/2011	1765101
ATV71 Installation Manual 55-630 kW	5.0 05 31/03/2011	1755849
ATV71 Installation Manual 0,37 - 90 kW	4.0 04 31/03/2011	1755843
ATV IMC Drive Controller Hardware Guide	4.0 08 01/04/2014	S1A10252
ATV IMC Drive Controller, Programming Guide	8.0 09 01/12/2015	EIO0000000390

Third-party components

Refer to the Operating Instructions of the relevant manufacturers for information on operation and maintenance of third-party components fitted in the system.

Additional documentation

To complement the information in these Operating Instructions, please read the following regulations and directives:

- safety regulations and accident prevention regulations
- instruction sheets, instruction booklets
- work instructions provided by the statutory accident insurance provider
- generally accepted occupational health regulations

2.3 Manufacturer

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Technical information

The technical information, figures and data contained in these Operating Instructions are correct at the time of printing.

2.4 Exclusion of liability

Our products undergo continuous further develop.

We therefore reserve the right to make any changes and improvements that we deem appropriate.

However, this does not, imply any obligation to apply such changes retrospectively to equipment already supplied.

2.5 Imprint

TAKTOMAT GmbH
 Rudolf-Diesel-Straße 14
 D-86554 Pöttmes

2.6 Copyright

Reproduction of these Operating Instructions or extracts thereof in the form of a reprint or photocopy, on electronic storage media or by any other means is not permitted except with our written consent.

All rights reserved.

2.7 Printing

Printed in the Federal Republic of Germany
 Pöttmes, April 2016

3 Document revision

Version	Date	Comment	Name
Version 1.1	26.07.2016	Revision of first edition	
Version 1.0.0	03.09.2015	First edition	

4 Safety information

4.1 General information

This document contains important information on the safe use of the Taktomat indexing controller. This information is intended to ensure personal safety and prevent damage to the Taktomat indexing controller. The information is intended for the operator and for properly trained, qualified and instructed staff responsible for operating and servicing the Taktomat indexing controller.

Additional task-specific safety information is included in the relevant sections on the different phases during the service life of the system.

Before installing and commissioning this equipment, read these safety and operating instructions thoroughly. Read all the warning labels on the equipment and make sure that none of them has been damaged or removed.

Live or hot parts of the equipment may be accessible during operation. In the event of incorrect installation or operation, there is a risk of severe injury or equipment damage if parts of the housing, the digital control panel or terminal box covers have been removed.

Further dangers may arise as frequency converters control rotating mechanical machine parts.

Follow the Operating Instructions carefully. Installation, commissioning and servicing may only be performed by qualified personnel. In accordance with the safety instructions, qualified personnel include such persons who are familiar with, and are qualified in, the installation, assembly, commissioning, operation and servicing of frequency converters.

To ensure this equipment is operated safely, it should only be used for its intended purpose.

After isolating the frequency converter from the power supply, it may take approx. 5 minutes for the intermediate circuit capacitors to completely discharge. For this reason, wait for this time before opening the equipment. All power-unit terminals can still supply hazardous voltages.

Children and unauthorized persons must be kept away from these items of equipment.

Keep these safety and operating instructions in an accessible location and pass them on to anybody who has any type of access to this equipment.

Additional task-related safety information is included in the relevant sections on the different phases during the service life of the system.

4.2 Explanation of the symbols used



DANGER!

This combination of symbol and alert word indicates an inherently dangerous situation which can be fatal or cause serious injury if it is not avoided.

! DANGER



WARNING!

This combination of symbol and alert word indicates a potentially dangerous situation which can be fatal or cause serious injury if it is not avoided.

! WARNING



CAUTION!

This combination of symbol and alert word indicates a potentially dangerous situation which can cause minor injury.

! CAUTION

NOTICE



NOTICE!

This combination of symbol and alert word indicates a potentially dangerous situation which can cause damage to property or harm the environment if it is not avoided.

4.3 Intended use

The Taktomat indexing controller is a component for controlling Taktomat asynchronous three-phase motors driving rotary indexing tables and linear transfer systems. The Taktomat Indexing Controller is designed for installation in electrical systems or machines, and must only be operated as an integrated component of the system or machine.

The following product standards concerning the Low Voltage Directive (LVD) must be observed when installing the Taktomat Indexing Controller in machines and systems:

CE certification has been performed in accordance with EN 50178, using the line filters indicated in this manual and in compliance with the corresponding installation instructions.

The frequency converter must only be operated within a CE compliant system.

Any use deviating from the intended use is regarded as inappropriate use.

The manufacturer is not liable for any resulting damage. Compliance with all instructions of this manual is part of intended use.

4.4 Foreseeable misuse

Any use beyond or other than the intended use is regarded as misuse.

- Any use outside the permitted operating limits
- Any use in conjunction with aggressive materials (such as acids)
- Transporting the system using the designated lifting points or eye bolts

4.4.1 Guarantee conditions

Changes to the structure of the materials used in the Taktomat Indexing Controller, including incorrect assembly and installation, can result in damage to the components. Failure to observe the instructions and warnings of the original documents for the Taktomat Indexing Controller components can also lead to damage to the Taktomat Indexing Controller or system. This is not considered as use within the scope of the equipment's intended use and will lead to a loss of guarantee and liability claims.

4.4.2 Directives, statutory provisions and standards

The following statutory provisions and standards have been applied:

EN 50178, 1997-10, Electronic equipment for use in power installations

EN 60204-1, 1997-12, Safety of Machinery, Electrical equipment on Industrial Machines – Part 1: General requirements (IEC 60204-1:1997) / Note: includes corrigendum of September 1998

EN 61010, A2, 1995 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements (IEC 950, 1991 + A1, 1992 + A2, 1993 + A3, 1995 + A4, 1996 modified)

Low Voltage Directive 2014/35/EU

EMC Directive 2014/30/EU

4.5 Technical condition of the machine

Do not use the Taktomat indexing controller if it is not in sound condition technically. If the machine is used when it is not in a sound condition technically, there is a risk of death or injury to staff and a risk of damage to property.

4.5.1 Make no changes in the safety provisions

The manufacturer has made safety provisions. No liability will be accepted if the operator of the Taktomat indexing controller makes any changes in the safety provisions without express permission.

4.6 General hazards

This section lists risks associated with the Taktomat Indexing Controller that remain even when it is operated according to its intended use.

To reduce the risk of personal injury or equipment damage, and to avoid potentially dangerous situations, the safety information provided here and in the other sections of these Operating Instructions must be observed.

4.6.1 Risk of death by electrocution

DANGER



Risk of death by electrocution!

There is an immediate risk of fatal injury due to electric shock if live components are touched.

Damage to the insulation or to individual components can cause fatal injury.

- ▶ Only allow work on the electrical system to be carried out by qualified electrical engineers.
- ▶ In the event of damage to the insulation, immediately shut off the power supply and initiate a repair.
- ▶ Before starting work on active parts of the electrical system or equipment, ensure that it is completely powered down and cannot be switched on again.

4.6.2 Risk of injury from moving parts

WARNING



Risk of injury from moving parts!

Moving parts can cause serious injury.

- ▶ Do not reach into moving parts or carry out work on moving parts while the system is in operation.
- ▶ Never open any covers while the system is in operation.

4.7 Responsibility of the operator

The Taktomat indexing controller is to be used commercially according to its intended use. The operator of the Taktomat indexing controller is therefore subject to statutory occupational health and safety provisions.

In addition to the general safety information contained in this document, any further safety, accident prevention and environmental regulations applicable to the field of application of the Taktomat indexing controller must also be observed.

In particular, operators have the following obligations:

- They must always be fully informed of the most recent occupational safety regulations and perform a risk assessment to identify any additional hazardous locations and places resulting from the specific working conditions at the place of use. They must document any such findings in the form of operating instructions (work instructions, work descriptions, etc.) for use during operation.
- During the entire service life of the Taktomat indexing controller, they must check whether the operating instructions they have written are compliant with current regulations and make any necessary adjustments.
- They must unambiguously regulate and define who is responsible for carrying out installation, operation, maintenance and cleaning.
- They must ensure that the staff deployed have the necessary qualifications for the work they are instructed to perform.
- They must ensure that all staff who work on the Taktomat indexing controller have read and understood all the documents relevant for its operation (Operating Instructions, maintenance regulations, safety guidelines).
- They must provide training for the staff at regular intervals and inform them of potential dangers.

- They must bear the responsibility for personal injury and damage to property arising from manipulation of the Taktomat indexing controller. For this reason, the Taktomat indexing controller and its safety equipment must be inspected at regular intervals to ensure that they are in sound condition and functioning properly, and the results of this inspection must be suitably documented.
- They must ensure that the Taktomat indexing controller is always in a sound condition technically.

4.7.1 Preventive measures

It is recommended that the operator take the following preventive measures:

- Only allow qualified, trained and properly instructed staff to work on the Taktomat indexing controller.
- Unambiguously define the responsibilities of operating and service personnel.
- Supplement these Operating Instructions with
 - stipulations deriving from national and regional labor and environmental regulations
 - adjust information covering specific operational aspects (workflows, supervisory obligations, reporting obligations, fire alarm equipment, etc.)
- Occasionally check to confirm that the Operating Instructions are being used and that such use is correct, and when necessary repeat the instruction process.
- Ensure that all documentation is permanently available in a readable form and easily accessible at the point of use.
- Observe any periodic checks and inspections that are required (by law) or specified in this document.
- Replace in good time any components indicated in these documents as being crucial for safety.
- Regularly inspect the Taktomat indexing controller to ensure that the safety equipment operates correctly.
- Make sure that safety information and hazard warnings on the Taktomat indexing controller and in the working area are always legible.
- Take steps to ensure that the Taktomat indexing controller is regularly inspected for visible damage and defects.

4.8 Staff qualification

The various activities described in these Operating Instructions require different qualifications of the staff entrusted with these duties.



⚠ WARNING

Danger if staff are insufficiently qualified!

Persons who are inadequately qualified are unable to assess the risks associated with working on the machine and expose themselves and others to the risk of serious or fatal injury.

- ▶ Ensure that all work is performed only by suitably qualified persons.
- ▶ Keep insufficiently qualified persons at a safe distance from the working area.

4.8.1 Qualified staff

For the purposes of these Operating Instructions, qualified staff are understood to be

- operators who have been specially trained and instructed in working with the Taktomat indexing controller.
- installation and service staff who have appropriate expertise in setting up and maintaining the Taktomat indexing controller and who are familiar with the safety information.
- The qualified staff must have read and understood the contents of the Operating Instructions before the Taktomat indexing controller is taken into service and must have been informed of the risks associated with working with the Taktomat indexing controller by the Taktomat indexing controller operator.
- A knowledge of first aid is required.

4.8.2 Competent specialists

Competent specialists are persons whose specialist training and experience have given them sufficient knowledge with respect to using this Taktomat indexing controller and who are sufficiently familiar with the relevant statutory occupational health regulations, accident prevention regulations, directives, and generally approved technical practice that they are able to assess whether the condition of the machine allows it to be used safely.

4.8.3 Auxiliary staff

Work on or in the vicinity of this Taktomat indexing controller which is not associated with the actual operation of the Taktomat indexing controller (e.g. cleaning, transport, material provisioning, etc.) can be performed by other persons. Before the machine is taken into service, the qualified staff of the Taktomat indexing controller operator must instruct such persons with regard to the nature of the work to be performed and the risks associated with working on the Taktomat indexing controller. Take special care when instructing persons who cannot read or write, and instruct them separately!

4.8.4 Servicing, repairing and maintaining the Taktomat indexing controller

Service, repair and maintenance work on the Taktomat indexing controller may only be carried out by service engineers of the manufacturer or by qualified staff authorized by Taktomat GmbH. When carrying out such work, always cordon off the working area carefully!

5 Labelling

5.1 5.1 ATV71 rating plate

There is a rating plate attached to the frequency converter:

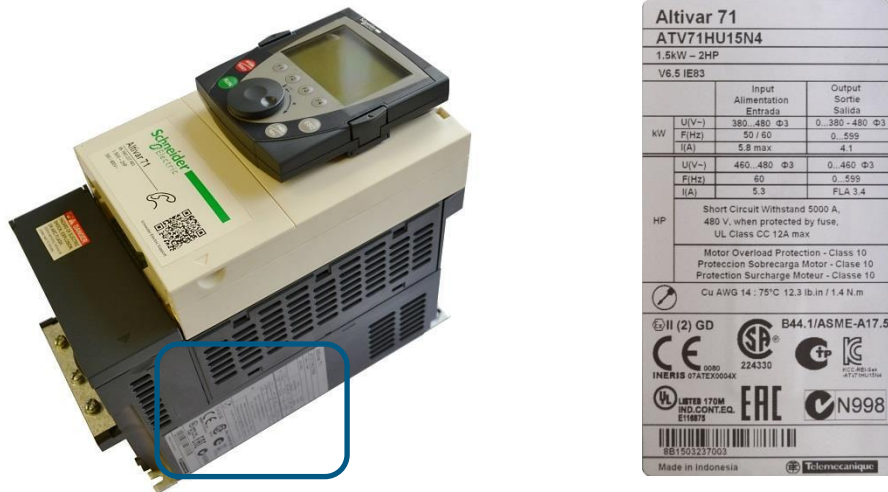


Figure 2 Example ATV71 rating plate

5.2 Altivar ATV-IMC VW3A3521 rating plate

There is a rating plate on the Integrated Drive Controller:

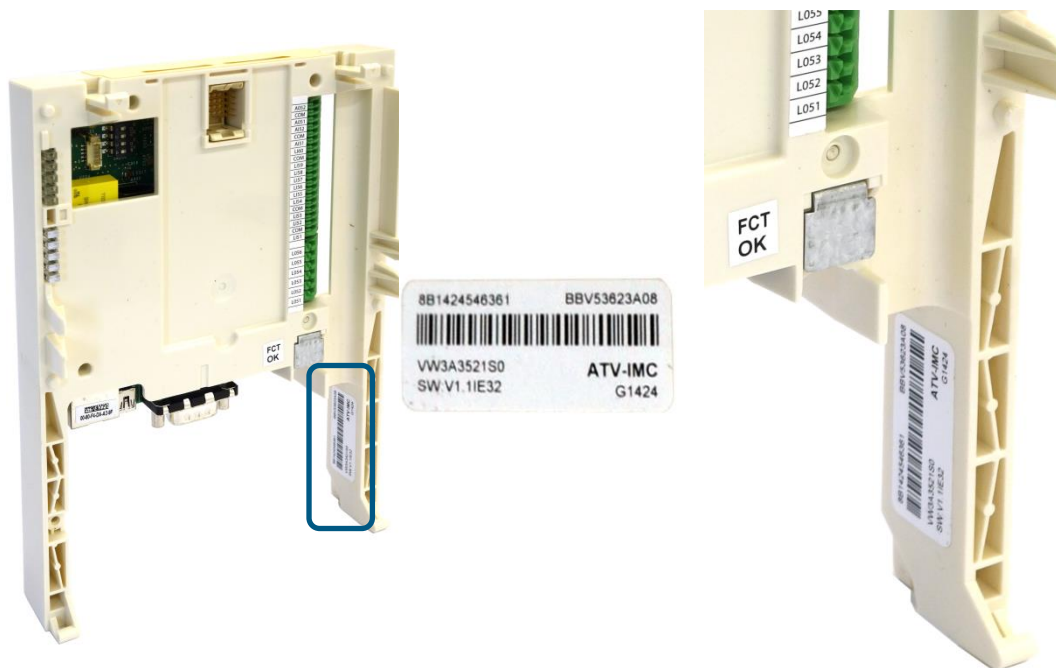


Figure 3 Example Altivar ATV-IMC VW3A3521 rating plate

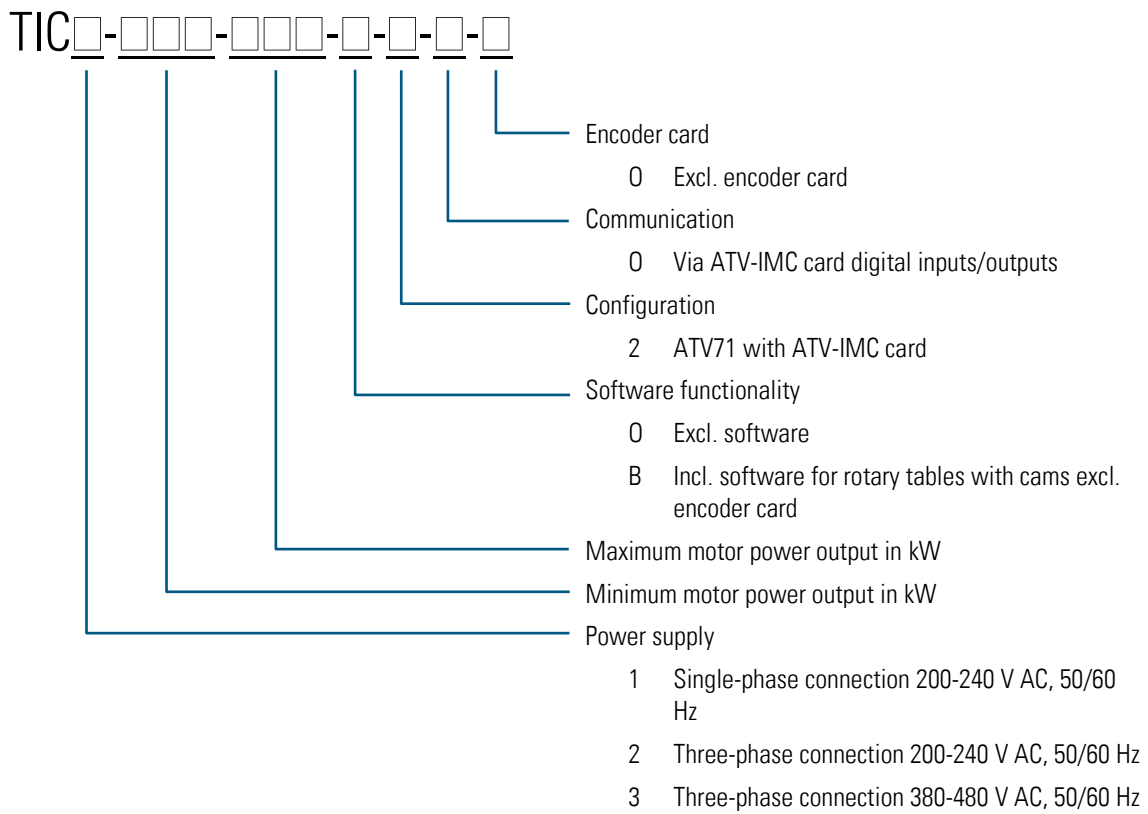
5.3 TIC rating plate

There is a TIC rating plate on the frequency converter:



Figure 4 Example rating plate TIC3-075-150-B-2-0-0

5.4 TIC model designation



5.4.1 Example model designation

TIC1-037-075-0-2-0-0

1	Single phase power supply 200-240 V AC, 50/60 Hz
037	Minimum motor power output 0.37 kW
075	Maximum motor power output 0.75 kW
B	Incl. software for rotary tables with cams excl. encoder card
2	Configuration 2, ATV71 with ATV-IMC card
0	Communication via ATV-IMC card digital inputs/outputs
0	Excl. encoder card

6 Construction and operation

6.1 Construction of TIC Taktomat indexing controller

The Taktomat indexing controller consists of the following components:

- (1) Altivar 71 Frequency Converter
 - (2) Altivar ATV-IMC Drive Controller (VW3A3521) (in integrated and removed state)
 - (3) Detachable graphic display terminal (VW3A1101)
- Personal safety stop option:
- (4) XPS- ATE Safety Relay for monitoring emergency stop circuits (can be ordered as an option)

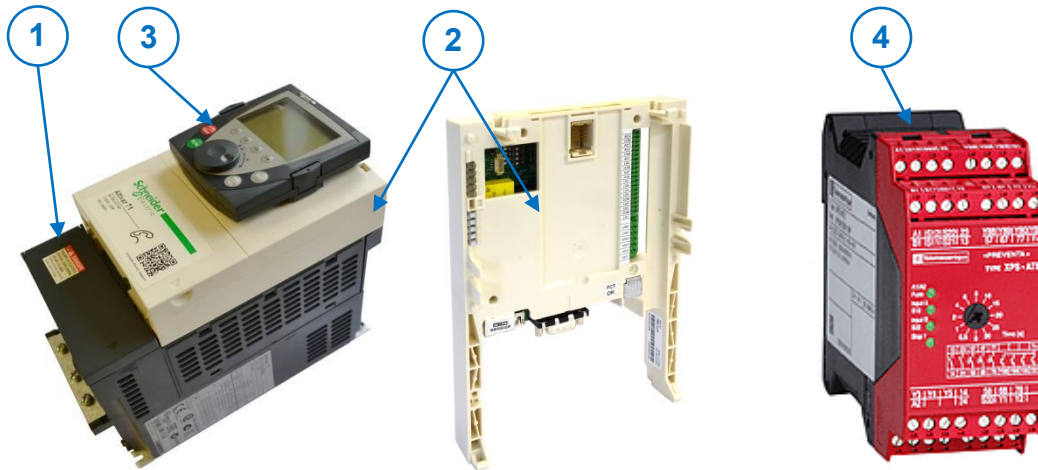
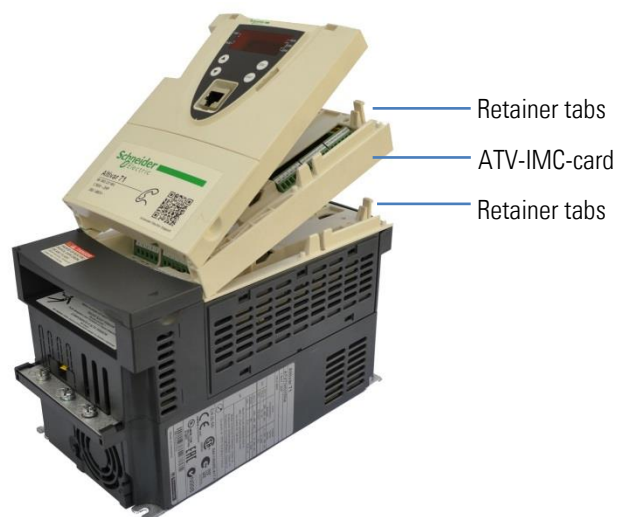


Figure 5 Construction of TIC Taktomat indexing controller

6.2 ATV-IMC card fitting and removal

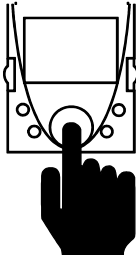
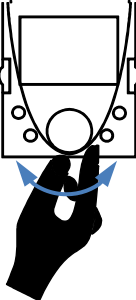

To remove the card or the front panel, use a screwdriver to release the retainer tabs and then lift the card out.

For detailed instructions on how to fit and remove the card, see the "ATV-IMC Drive Controller Hardware Manual (S1A34916.08)" by Schneider Electric. These instructions must be followed.



6.3 Operation using the graphic display terminal

The Taktomat Indexing Controller can be operated using the supplied graphic display terminal.

<p>Pressing the navigation wheel</p>		<p>Access the main menu. Save the current value. Activate the selected menu. Access the selected function.</p>
<p>Turning the navigation wheel</p>		<p>Change the parameter. Select preconfigured parameters. Select menu options.</p>
<p>Pressing the ESC button</p>		<p>Cancel changes to the parameter. Discard a value. Return to the previous menu</p>

7 Terminal assignments. Input and output signals

7.1 Overview of terminal assignments and input and output signals

	Terminal	Designation	Function
Inputs	LI1		Bridge to L055 Open for personal safety stop function
	LI2		Bridge to L056 Open for personal safety stop function
	LI5	Monitoring of braking voltage	0 = fault, power supply to brake 1 = power supply to brake OK
	LI51	Position sensor	0 = rotary table not in position 1 = rotary table in position
	LI52	Start	In automatic mode, flank 0→1 = complete cycle In manual mode 0 = no response In manual mode 1 = rotation at speed 1
	LI53	Direction	0 = ccw (counterclockwise) 1 = cw (clockwise)
	LI54	Operating mode	0 = manual mode, speed 1, ramps 1 1 = automatic mode, speed and ramps can be selected via LI56
	LI55	Measurement run	Flank 0→1 starts measurement run
	LI56	Speed	0 = slow (speed 1, ramps 1) 1 = fast (speed 2, ramps 2)
	LI57	Reset fault	Flank 0→1 clears fault memory
	LI58	Stop	Flank 1→0 immediate stop ramp 0 = driving operation not possible 1 = driving operation possible
		PWR	Power Removal
Outputs/relays	L051	Position notification	0 = rotary table not in position 1 = rotary table in position
	L052	Ready to start	0 = drive rotating or converter not ready (fault), or LI54 = 0 1 = ready for next start in automatic mode
	L053	Fault, cycle time	0 = no fault 1 = cycle time exceeded
	L054	Fault, position overrun	0 = no fault 1 = moved from dwell position in automatic mode without prior start signal
	L055		Bridge to LI1 Open for personal safety stop function
	L056		Bridge to LI2 Open for personal safety stop function
	R1A/R1C	Fault, braking voltage (see LI5)	Relay not switched = no fault Relay switched = no 24 V DC supply for brake on LI5
	R2A/R2C	Motor brake output (24 V DC)	Relay not switched = brake applied Relay switched = brake not applied

7.2 Description of input and output signals

7.2.1 Input LI5 "monitoring of braking voltage"

The controller checks whether the 24 V DC supply for the brake is present on the input of the frequency converter. Consequently, we recommend using a 24 V DC brake when using the TIC Taktomat Indexing Controller.

If an AC or higher voltage brake is used, check the voltage of the external brake relay on this input (if this has a 24 V DC control coil) or switch the 24 V DC to the input LI5 using a free NOC on the external brake relay.

If 24 V DC is not present on the input, a fault notification is generated (see section "ATV-IMC fault notification").

Operation is no longer possible.

0 = fault, power supply to brake

1 = power supply to brake OK

7.2.2 Input LI51 "position sensor"

The PNP output of a switching 24 V DC inductive proximity sensor is connected here.

0 = rotary indexing table not in position

1 = rotary indexing table in position

7.2.3 Input LI52 "Start"

Automatic mode

The controller analyses the LI52 input of the ATV-IMC card. If a rising flank 0 V DC → 24 V DC (0 → 1) is detected on the input, the motor will start if all other requirements are fulfilled.

Flank 0 → 1 = complete cycle

Inching mode

In inching mode, the voltage level on the input is analysed. If all requirements are fulfilled for inching mode, the motor will rotate as long as 24 V DC is present on the input. The motor always rotates at "Speed 1 Auto"

0 = no response

1 = rotation at speed 1

7.2.4 Input LI53 "Direction"

This input influences the direction of the drive motor. In both automatic and inching mode the input voltage is always queried with the arrival of the start flank. This influences how the equipment starts the next time.

0 = ccw (counterclockwise)

1 = cw (clockwise)

The direction of rotation depends on the configuration of the rotary indexing table, e.g. on the gear motor, and it can rotate in a different direction to the one given here.

The direction of rotation can be changed in the "QUICK START MENU" under the menu option "Phase rotation".

RDY	Term	0.0 A	+50.0Hz
1.1	SIMPLY START		^
Auto tuning status	:		
Output Ph rotation	:		ACB
Mot. therm. Current	:		s
Acceleration	:		s
Deceleration	:		s
Code	<<	>>	Quick V

7.2.5 Input LI54 "Operating mode"

This signal allows switching between two operating modes: "manual mode" and "automatic mode".

0 = manual mode

1 = automatic mode

7.2.6 Input LI55 "Measurement run"

The measurement run is started with a rising signal flank.

0 = normal operation possible

0→1 = starts the measurement cycle for the cam length of the position cam

7.2.7 Input LI56 "Speed"

This input only influences the automatic operating mode. The speed in automatic mode can be preset using this input.

0 = The speed set in the parameter "Speed1 Auto" is used.

1 = The speed set in the parameter "Speed2 Auto" is used.

7.2.8 Input LI57 "Reset fault"

The **application software** will only clear a rising signal flank 0→1 fault on this input if the cause of the fault(s) has (have) been resolved.

7.2.9 Input LI58 "Stop"

This input influences all control operating modes.

0 = immediately stops the commenced cycle via the "DEC Stop" ramp. Further operation is not possible.

1 = rotary indexing table operation possible

7.2.10 Input PWR "Power Removal"

If no 24 V DC power is present on the PWR input, it will not be possible to start the motor (in compliance with functional safety standards EN 954-1, ISO 13849-1 and IEC / EN 61508). Uncontrolled or unexpected restarting of the motor is prevented through electronic locking of the "Power Removal" function. The power removal function (PWR) has priority over every movement command.

For a more detailed description of the "Power Removal" function, see the original documentation provided by Schneider Electric for the Altivar 71 Frequency Converter.

7.2.11 Output LO51 "Position notification"

This output is switched in all operating modes. The LI51 "position sensor" input status is included to generate this signal.

0 = The rotary indexing table is between two valid positions.

1 = The rotary indexing table is in position (resting phase). This does not mean that the drive is no longer revolving. The drive does not revolve if the LO52 ("Ready to start") = 1.

NOTICE



- ▶ Depending on the selected operating mode (automatic mode, inching mode, measurement cycle) or fault situation you must decide whether:
 - ⇒ Start external machining
 - ⇒ Don't start external machining

7.2.12 Output LO52 "Ready to start"

This output is only switched in automatic mode.

0 = The drive is revolving or there is a fault.

1 = The drive is stationary. This is the earliest possible time the next start command will be accepted. Earlier start commands are ignored.

7.2.13 Output LO53 "Cycle time fault"

0 = no fault, normal operation possible

1 = shows fault, "cycle time exceeded", if the cycle time is greater than the parameter time "Time monitoring" in the "Taktomat GmbH" menu. This fault can be cleared by means of LI57 ("Reset fault") = 1. Causes may include mechanical binding or a blockage to the rotary indexing table's rotary table, or the time set in the parameter "Time monitoring" is lower than the actual cycle time.

7.2.14 Output L054 "Fault, position overrun"

This output is set if the position cam is not or no longer detected when the drive is stationary in the automatic operating mode.

0 = normal operation possible

1 = The rotary indexing table is not in position. External machining must not be started or commenced movements must be safely reset.

After eliminating the cause and resetting the fault (by means of the signal "Reset fault"), operation of the rotary indexing table can be continued. The next start triggers a soft acceleration ramp (parameter "DEC Start").

⚠ WARNING



Danger of collision if L054 output signal not checked!

Not checking the L054 output signal may cause serious personal injury or equipment damage.

- ▶ Do not start external machining if the output signal is set.
- ▶ Safely reset commenced movements immediately.

7.2.15 Relay R1A/R1C "Fault, braking voltage"

The relay is switched if there is no 24 V DC voltage present on the input LI5 ("Monitoring of braking voltage"). If the fault occurs, the movement is stopped by means of the "DEC Stop" ramp.

Relay not switched = no fault

Relay switched = 24 V DC braking voltage fault

7.2.16 Relay R2A/R2C "Motor brake output (24 V DC)"

This output is a voltage-free relay contact. The output is set as soon as the converter is ready for operation and the frequency converter reports no faults.

It remains activated the entire time the converter is in use. The brake is not required to stop the drive. This ensures absolutely no wear is caused to the drive.

Relay not switched = brake applied

Relay switched = brake not applied

⚠ CAUTION



DAMAGE TO ELECTRICAL OR ELECTRONIC COMPONENTS!

When connecting inductive loads, the outputs must be protected against overvoltage using recovery diodes.

8 Functionality

8.1 Overview of functions

The Taktomat Indexing Controller is a combination of the Altivar 71 Frequency Converter with an integrated Altivar ATV-IMC Drive Controller pre-programmed by Taktomat GmbH

- The Taktomat indexing controller supports automatic and manual operation. The Taktomat indexing controller allows the parameters for two movement profiles (speed, acceleration and delay) to be programmed and selected by means of a signal.
- Fast, gentle braking by means of brake ramps in the event of a stop for reduced gear wear and soft restart from an intermediate position or after an emergency stop.
- Machine-protecting inching mode.
- Oscillating or reverse rotation direction without additional hardware.
- Time-optimised cycles using the overtravel option.

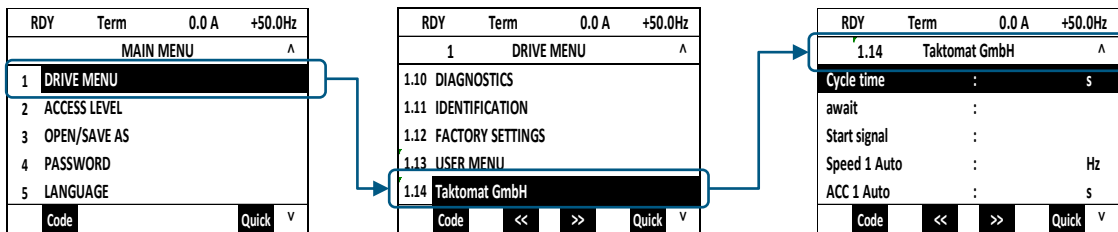
8.2 Software version

The current software version is V5.00. The application software version is displayed in the “Taktomat GmbH” menu.

8.3 “Taktomat GmbH” menu description

To interact with the operator, a “Taktomat GmbH” menu was implemented in the ATV-IMC card of the Taktomat Indexing Controller. It allows the configuration of function-specific parameters using the graphic display terminal without the need for additional external software.

How to navigate to the “Taktomat GmbH” menu:



NOTICE



Damage will be caused to the machine if the example values are used!

Equipment damage may be caused if the example values are used!

Displayed menu values are examples!

- ▶ DO NOT use these values as presets!
- ▶ Use the values from the technical data of the drive manufacturer.

Menu option	Description																																
<table border="1"> <tr><td>RDY</td><td>Term</td><td>0.0 A</td><td>+50.0Hz</td></tr> <tr><td>1.14</td><td>Taktomat GmbH</td><td></td><td>^</td></tr> <tr><td>Cycle time</td><td>:</td><td></td><td>s</td></tr> <tr><td>await</td><td>:</td><td></td><td></td></tr> <tr><td>Start signal</td><td>:</td><td></td><td></td></tr> <tr><td>Speed 1 Auto</td><td>:</td><td></td><td>Hz</td></tr> <tr><td>ACC 1 Auto</td><td>:</td><td></td><td>s</td></tr> <tr><td>Code</td><td><<</td><td>>></td><td>Quick v</td></tr> </table>	RDY	Term	0.0 A	+50.0Hz	1.14	Taktomat GmbH		^	Cycle time	:		s	await	:			Start signal	:			Speed 1 Auto	:		Hz	ACC 1 Auto	:		s	Code	<<	>>	Quick v	Actual cycle time
RDY	Term	0.0 A	+50.0Hz																														
1.14	Taktomat GmbH		^																														
Cycle time	:		s																														
await	:																																
Start signal	:																																
Speed 1 Auto	:		Hz																														
ACC 1 Auto	:		s																														
Code	<<	>>	Quick v																														
Wait for start signal	Status line 1 and 2. These lines must always be read together. For example, “Wait for”+“start signal” → “Wait for start signal”																																
Speed 1 Auto	Rotation speed 1 in Hz (automatic and manual mode)																																
ACC 1 Auto	Acceleration ramp 1 in s																																

RDY	Term	0.0 A	+50.0Hz
1.14	Taktomat GmbH		^
DEC 1 Auto : s			
Speed 2 Auto : Hz			
ACC 2 Auto : s			
DEC 2 Auto : s			
Overtravel :			
Code	<<	>>	Quick v

DEC 1 Auto	Delay ramp 1 in s
Speed 2 Auto	Rotation speed 2 in Hz (automatic mode only)
ACC 2 Auto	Acceleration ramp 2 in s
DEC 2 Auto	Delay ramp 2 in s
Overtravel	Function activated/deactivated here (yes/no)

RDY	Term	0.0 A	+50.0Hz
1.14	Taktomat GmbH		^
Overtravel : %			
Time monitoring : s			
ACC Stop : s			
DEC Stop : s			
SW Version :			
Code	<<	>>	Quick v

Overtravel	Setting for the overtravel on the cam in % (time optimisation). Starting point is the rising flank of the cam sensor.
Time monitoring	Time in which the cycle is to complete.
ACC Stop	Acceleration ramp with which the first resting phase is started following an emergency stop.
DEC Stop	Braking ramp for EMERGENCY STOP (LI58 = 1 changes to 0)
SW Version	Application software version

RDY	Term	0.0 A	+50.0Hz
1.14	Taktomat GmbH		^
ACC Stop : 0.56 s			
DEC Stop : 0.10 s			
SW Version : 5.00			
Modbus add Prg C. : 1			
DATE/TIME SETTINGS			
Code	<<	>>	Quick v

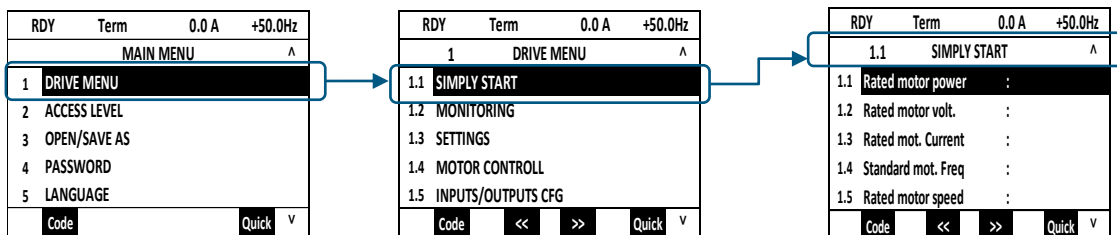
Modbus add Prg C.	Terminal address allocation
DATE/TIME SETTINGS	Set date and time

8.4 Important function parameters and presets

On commissioning or restoring to factory settings, the following parameters must be checked and configured. Example configuration of three-phase motor based on motor rating plate.

8.4.1 Frequency converter menu "QUICK START MENU"

How to navigate to the "QUICK START MENU":



Parameter value presets:

Enter the values from your motor rating plate into the areas shown.

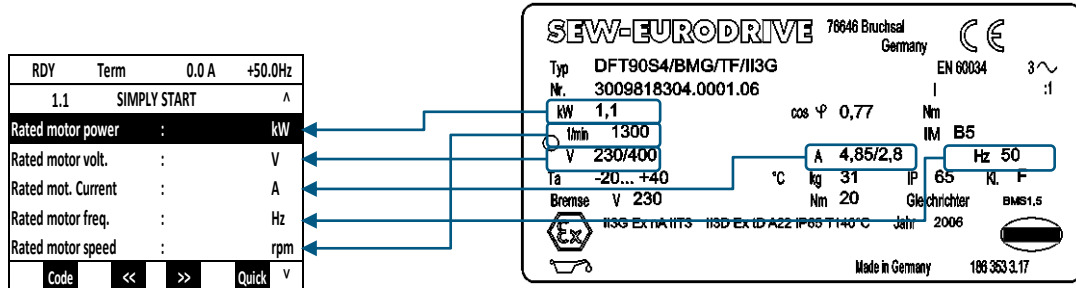


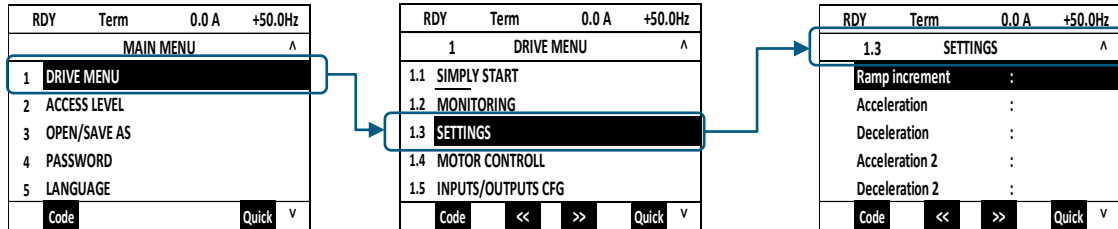
Figure 6 Example motor rating plate

RDY	Term	0.0 A	+50.0Hz
1.1	SIMPLY START		^
Mot. therm. Current : A			
Acceleration : s			
Deceleration : s			
Low speed : Hz			
High speed : Hz			
Code	<<	>>	Quick v

Menu option	Value range	Preset
Low speed	0 to 1000 Hz	3 Hz
High speed	1 to 1000 Hz	60 Hz

8.4.2 Frequency converter menu "SETTINGS"

How to navigate to the "SETTINGS" menu:



Parameter value presets

RDY	Term	0.0 A	+50.0Hz
1.3	SETTINGS		^
Ramp increment : %			
Acceleration : s			
Deceleration : s			
Acceleration 2 : s			
Deceleration 2 : s			
Code	<<	>>	Quick v

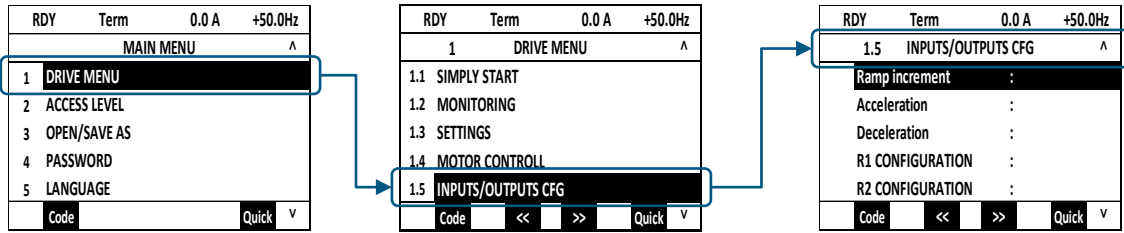
Description	Value range	Preset
Ramp increment	0.01 – 0.1 – 1	0.01

RDY	Term	0.0 A	+50.0Hz
1.3	SETTINGS		^
High speed : Hz			
Mot. therm. Current : In			
Speed prop. Gain : %			
Speed time integral : %			
K speed loop filter :			
Code	<<	>>	Quick v

Description	Value range	Preset
Speed prop. gain	0 to 1000 %	40 %
I part speed cont	1 to 1000 %	100 %
K speed loop filter	0 to 100	100

8.4.3 Frequency converter menu "INPUTS/OUTPUTS CFG"

How to navigate to the "INPUTS/OUTPUTS CFG" menu:



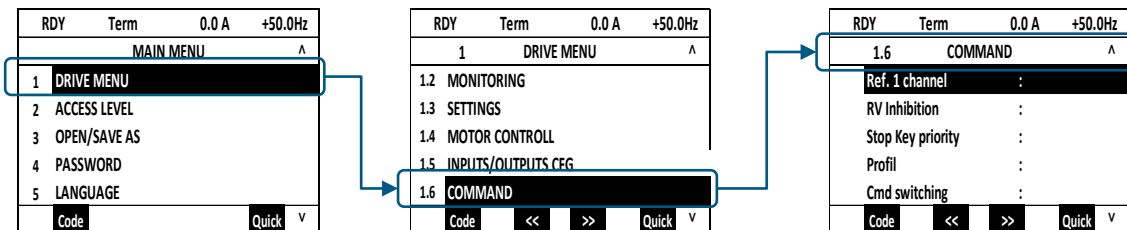
Voreinstellungen der Parameterwerte.

RDY	Term	0.0 A	+50.0Hz
MAIN MENU ^			
1.5	INPUTS/OUTPUTS CFG		^
Ramp increment :			
Acceleration :			
Deceleration :			
R1 CONFIGURATION :			
R2 CONFIGURATION :			
Code	<<	>>	Quick v

Description	Value range	Preset
R1 CONFIGURATION	Preset entries	No
R2 CONFIGURATION	Preset entries	No fault

8.4.4 Frequency converter menu „COMMAND“

How to navigate to the „COMMAND“ menu.



Parameter value presets:

RDY	Term	0.0 A	+50.0Hz
MAIN MENU ^			
1.6	COMMAND		^
Ref. 1 channel :			
RV Inhibition :			
Stop Key priority :			
Profil :			
Cmd switching :			
Code	<<	>>	Quick v

Description	Value range	Preset
Ref. 1 channel	Preset entries	C.Insid. card

Note

- AI1 : Analog input
- AI2 : Analog input
- AI3 : Analog input, if VW3A3202 extension card has been inserted
- AI4 : Analog input, if VW3A3202 extension card has been inserted
- HMI : Graphic display terminal
- Modbus : Integrated Modbus
- CANopen : Integrated CANopen
- Kom. Karte : Communication card (if inserted)
- PLC Karte : Controller Inside card (if inserted)
- RP : Frequency input, if VW3A3202 extension card has been inserted,
- Encoder : Encoder input, if encoder card has been inserted

RDY	Term	0.0 A	+50.0Hz
	1.6	COMMAND	^
Ref. 1 channel			
	RV Inhibition	:	
	Stop Key priority	:	
	Profil	:	
	Cmd switching	:	
Code	<<	>>	Quick v

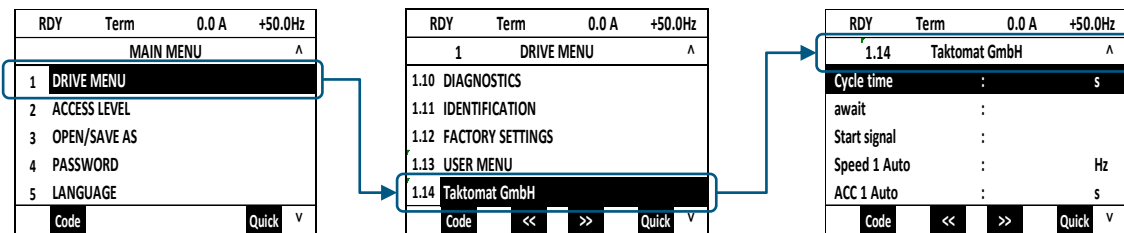
Description	Value range	Preset
Profil	Preset entries	Separate

Note

8 Serie : The [8 serie] (SE8) configuration is used to load, via PC-Software, for example, an ATV58 drive configuration in an ATV71 that has already been set to this configuration.
 configuration
 Not separ. : Reference and command, not separate
 Separate : Separate reference and command
 I/O profile : I/O profile

8.4.5 "Taktomat GmbH" menu

How to navigate to the "Taktomat GmbH" menu:



Parameter value presets:

RDY	Term	0.0 A	+50.0Hz
	1.14	Taktomat GmbH	^
	Cycle time	:	s
	await	:	
	Start signal	:	
	Speed 1 Auto	:	Hz
	ACC 1 Auto	:	s
Code	<<	>>	Quick v

Description	Value range	Preset
Speed 1 Auto	5.0 – 35.0 Hz	25 Hz
ACC 1 Auto	0.01-99.99 s	0.02 s*

RDY	Term	0.0 A	+50.0Hz
	1.14	Taktomat GmbH	^
	DEC 1 Auto	:	s
	Speed 2 Auto	:	Hz
	ACC 2 Auto	:	s
	DEC 2 Auto	:	s
	Overtravel	:	
Code	<<	>>	Quick v

Description	Value range	Preset
DEC 1 Auto	0.01-99.99 s	0.02 s*
Speed 2 Auto	35.0 – 60.0 Hz	50 Hz
ACC 2 Auto	0.01-99.99 s	0.02 s*
DEC 2 Auto	0.01-99.99 s	0.02 s*
Overtravel	YES/NO	NO

RDY	Term	0.0 A	+50.0Hz
	1.14	Taktomat GmbH	^
	Overtravel	:	%
	Time monitori	:	s
	ACC Stop	:	s
	DEC Stop	:	s
	SW Version	:	
Code	<<	>>	Quick v

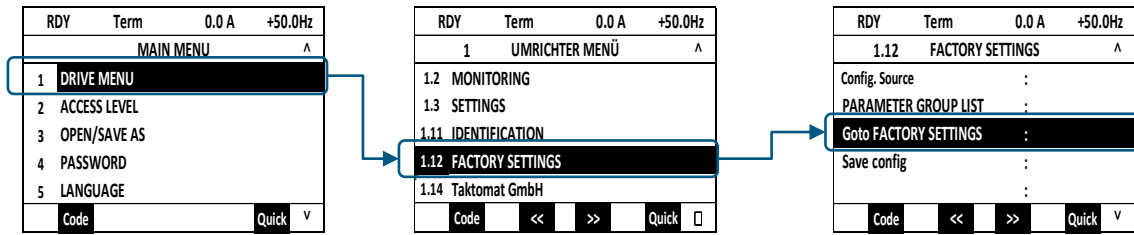
Description	Value range	Preset
Overtravel	0 bis 100 %	1 %
Time monitori	0.1-999.9 s	500.0 s**
ACC Stop	0.01-99.99 s	1.5 s*
DEC Stop	0.01-99.99 s	0.3 s*

* Values dependent on size and/or load. Please query with Taktomat.

** tm + 1 s (tm = motor running time from start to stop)

8.5 Resetting the parameters to factory settings

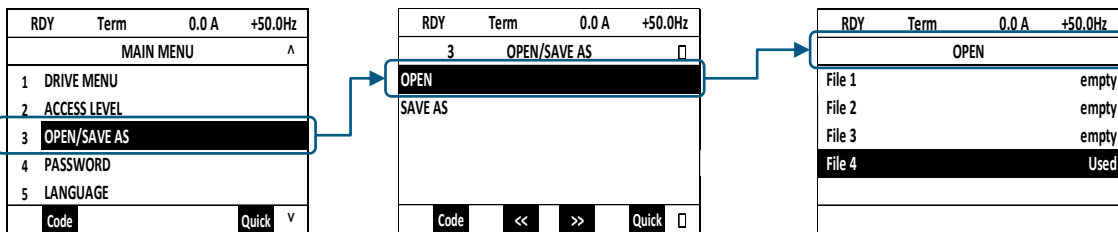
Frequency converter parameters can be reset to factory settings via the "FACTORY SETTINGS" menu.



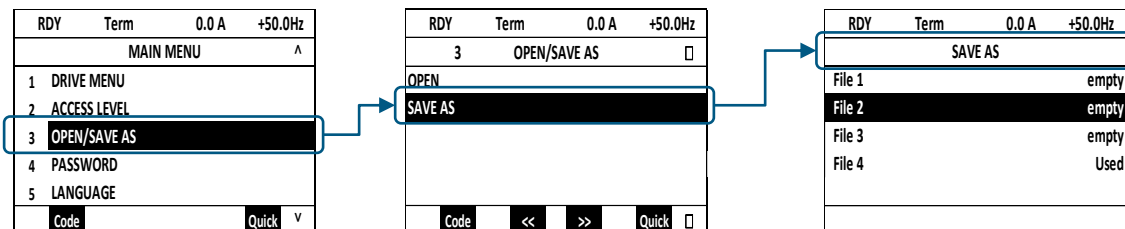
8.6 Saving and loading parameters

The presets the TIC is supplied with are saved in the supplied graphic display terminal under "File 4" in the menu "LOAD/SAVE AS" → "OPEN".

How to navigate to the "OPEN" menu:



Die aktuelle Parameter der TIC (Frequenzumrichter + ATV-IMC) lassen sich im Menü „SPEICHERN UNTER“ sichern. Navigation zum Menü „SPEICHERN UNTER“.



8.7 ATV-IMC notifications

The current function status of the application is displayed using notifications in the status lines in the "Taktomat GmbH" menu.

Notification	Description/Function/Cause
"Manual mode active"	Ready to start in manual mode
"Wait for start signal"	Ready to start in automatic mode
"Clockwise direction"	Motor movement direction
"Counterclockwise direction"	Motor movement direction
"Emergency stop active"	Signal "Stop" = 0 (LI58 = 0)
"Fault, power supply to brake"	No 24 V DC voltage present on terminal LI5 ("Monitoring of braking voltage").
"Cam overrun"	"Position sensor" (LI51) signal = 0, no signal from inductive proximity sensor
"Cycle time exceeded"	Actual cycle time is greater than the set "Cycle time monitoring" parameter in the "Taktomat GmbH" menu.

8.8 ATV71 ATV-IMC card reset fault

Application software fault notifications can be reset by means of the rising flank of the signal "Reset fault" = 0 1 (terminal LI57).

9 Operating modes

The Taktomat indexing controller can be operated in the following modes depending on the "Operating mode" signal:

- ⇒ Automatic mode
- ⇒ Manual mode

9.1 Manual mode

In manual mode, the rotary table rotates for as long as the "Start" signal is active (LI52=1). Rotation is stopped if the "Start" signal is not active (LI52 = 0) or if the signal is sent from the position sensor ("Position sensor" = 1 (LI51)). This means rotation can start and stop at the desired position.

In manual mode, "Speed 1 Auto" is always selected irrespective of which speed ("Speed" signal (LI56)) "Speed1 Auto" or "Speed2 Auto" is selected.

The rotary table is started outside the dwell phase by means of the "DEC Stop" accelerator ramp..

⚠ WARNING



DANGER IF PARAMETERS SET INCORRECTLY!

- ▶ In manual mode, the ramp "ACC Auto 1" is used to accelerate and the ramp "DEC Auto 1" is used to brake. The superimposed acceleration and delay of the drive and cam rollers can lead to excessive inertia which can cause mechanical damage to the system.

9.2 Automatic mode

The following functions are available in automatic mode:

- Normal mode
Im Normalbetrieb dreht der Rundtisch immer in eine Richtung. Für die Zeitoptimierung kann die Funktion „Nachlauf“ im „Taktomat GmbH“-Menü eingeschaltet werden.
- Oscillating mode
In oscillating mode, the rotary table always rotates back and forth between two positions. For time-optimised operation, the "Overtravel" function should be disabled in the "Taktomat GmbH" menu.

In "Auto" mode ("Operating mode" signal = 1), the rotary table revolves in a complete cycle. The cycle is triggered by the rising flank of the "Start" signal (LI52 = 0→1). As soon as the signal is sent from the position sensor, rotation is stopped. Rotation can only be stopped by resetting the "Stop" signal (LI58 = 0) on the stop ramp (DEC stop).

⚠ WARNING



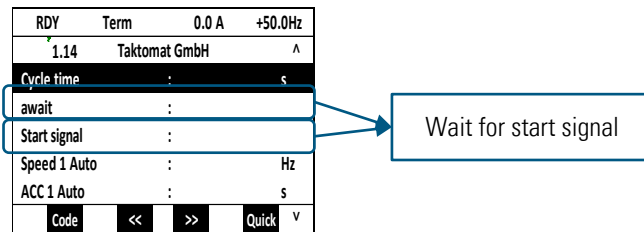
INCORRECT PARAMETER SETTING!

- ▶ If the brake ramp "DEC Stop" is set too short, the superimposing of acceleration and delay of the drive and cam rollers can lead to excessive inertia. This can cause mechanical damage to the rotary table and the system. Select the setting according to the mechanical loads.

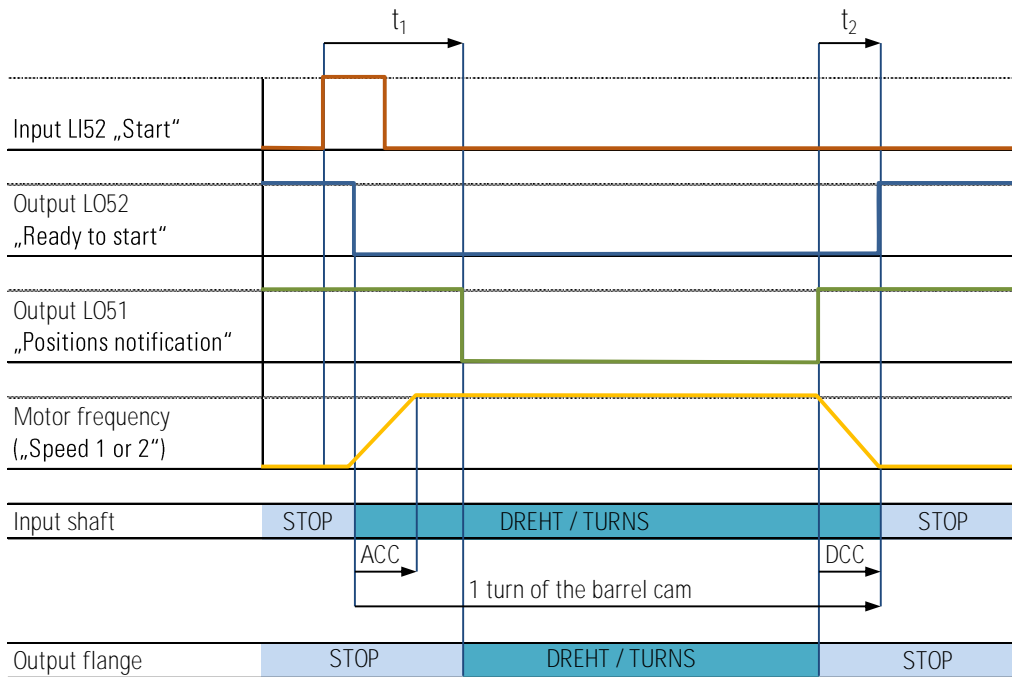
The following preconditions must be fulfilled before starting:

- Frequency converter is ready to start, status code "RDY"
- Input signal "Operating mode" = 1 (automatic) (LI54)
- Input signal "Start" = 0 (LI52)
- Input signal "Position sensor" = 1 (sensor active) (LI51)
- Input signal "Power supply to brake" = 1 (LI5)
- Input signal "Stop" = 1 (LI58)
- 24 V DC present on PWR terminal

When in automatic mode, the ATV-IMC card's application software is ready to start if no faults are detected and the input signals are set correctly. If so, "Wait for start signal" is displayed in the status lines in the "Taktomat GmbH" menu.



Automatic mode, complete cycle with no delay for stopping the drive



t_1 - time for leaving the position cam

t_2 - time between detecting the position cam and stopping

9.2.1 "Overtravel" function

The cycle time can be optimised when the "Overtravel" option is activated. This is achieved by stopping at the end of the dwell phase. For further information, see function diagram.

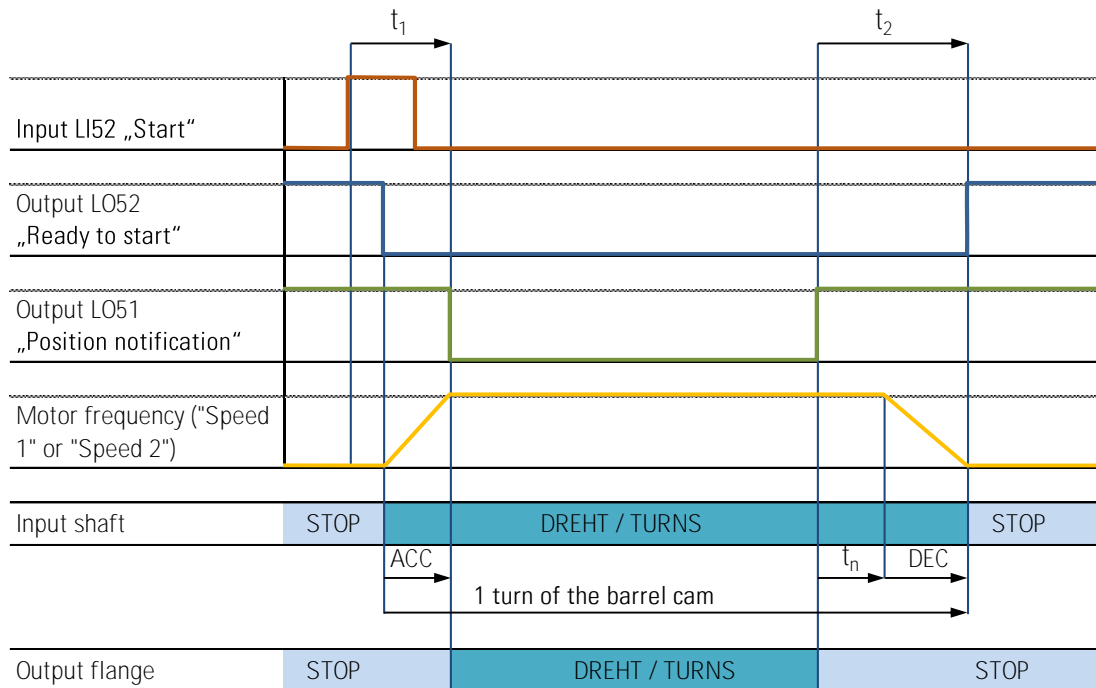
! CAUTION



PERFORM MEASUREMENT RUN AFTER CHANGING THE SPEED!

When using the "Overtravel" option in automatic mode, you must perform a measurement run after changing the speed to ensure the cam length is remeasured for the new speed.

Automatic mode, complete cycle with delay for stopping the drive



- t₁ - time for leaving the position cam
- t₂ - time between detecting the position cam and stopping
- t_n - time delay for stopping the drive

9.2.2 "Measurement run" function

The measurement run must be performed each time the speed parameter is changed. The measurement run should be performed at the operating speed.

During the measurement run, the rotary indexing table will rotate at least one complete cycle until the position sensor detects two rising flanks. The measurement run function will stop after the second flank.

⚠ WARNING



RISK OF INJURY FROM MOVING PARTS!

During the measurement run, the rotary indexing table will rotate **WITHOUT STOPPING** until it has completed two cycles. You must check that the rotary table can rotate freely for two complete cycles without a collision occurring on the machine. Stop all external machining during the measurement cycle, and only recommence it once the measurement run is completed.

The time is measured during which the signal from the position sensor is active while the measurement run is being performed. This time is used as the 100 % reference to calculate the "Overtravel" function.

9.3 System behaviour in the event of a stop in automatic mode

The rotary indexing table stops movement via the ramp "DEC Stop" if a fault is detected or no voltage is present on LI58 (stop).

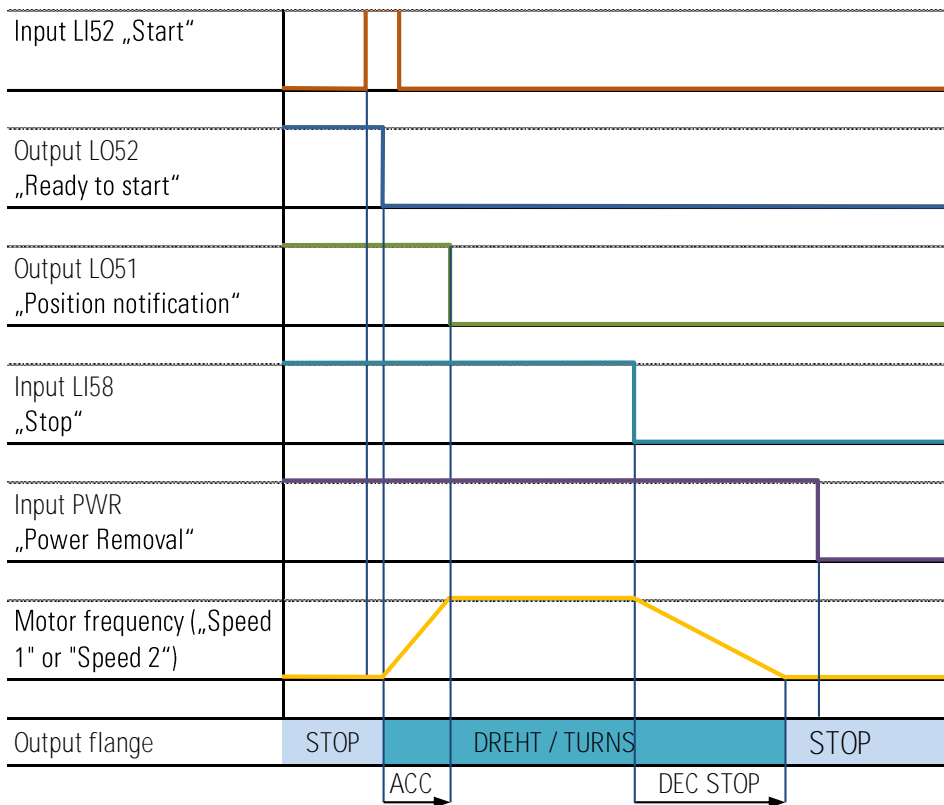
⚠ WARNING



INCORRECT PARAMETER SETTING!

- ▶ If the brake ramp "DEC Stop" is set too short, the superimposing of acceleration and delay of the drive and cam rollers can lead to excessive inertia. This can cause mechanical damage to the rotary table and the system. Select the setting according to the mechanical loads.

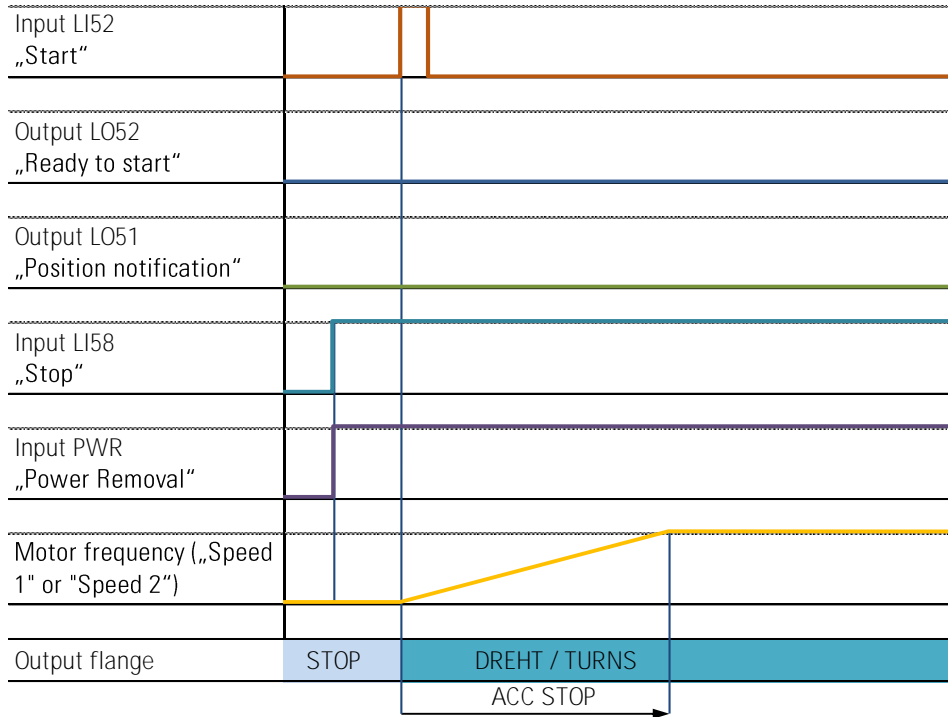
Automatic mode, stop during rotation



9.4 System behaviour in the event of a start from an intermediate position in automatic mode

In automatic mode, the rotary indexing table starts from the intermediate position by means of the ramp "ACC Stop"

Automatic mode, start from intermediate position



9.5 Commissioning and troubleshooting instructions

This section provides instructions which will assist the user in commissioning the Taktomat Indexing Controller and for troubleshooting.

CAUTION



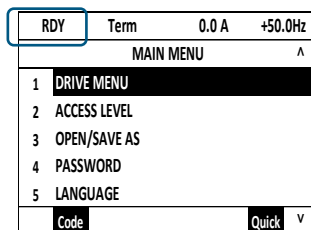
OPERATING DANGER!

- ▶ Ensure all installation work is completed fully and correctly.
- ▶ If mechanical and electrical system components are fitted with transportation and locking mechanisms, remove these.
- ▶ Remove tools, measurement devices and any waste parts from the items of equipment.

Failure to observe these instructions may lead to personal injury or equipment damage.

9.5.1 Frequency converter status

During commissioning or troubleshooting, always check the status of the frequency converter first. The frequency converter is ready if the status code "RDY" (Ready) is displayed in the top left corner of the graphic display terminal.



Note: The current status of the converter is displayed in the top left corner of the graphic display terminal.

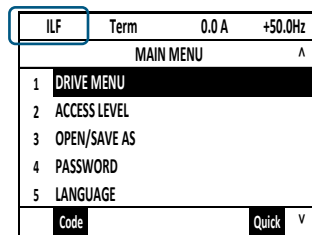
Operating modes

Overview of converter status codes:

ACC	Ramp up time acceleration
CLI	Current limitation
CTL	Controlled stop on input phase loss
DCB	DC injection braking in progress
DEC	Ramp down time deceleration
FLU	Motor fluxing in progress
FST	Fast stop
NLP	No line power present on L1, L2 & L3 input terminals
NST	Free wheel stop
OBR	Automatically adapted deceleration
PRA	Power removal active
RDY	Frequency converter ready
RUN	Frequency converter running
SOC	Controlled output cut in progress
TUN	Auto-tuning in progress
USA	Undervoltage alarm

9.5.2 Frequency converter faults

If a fault occurs with the frequency converter, the current fault code is displayed in the top left corner.

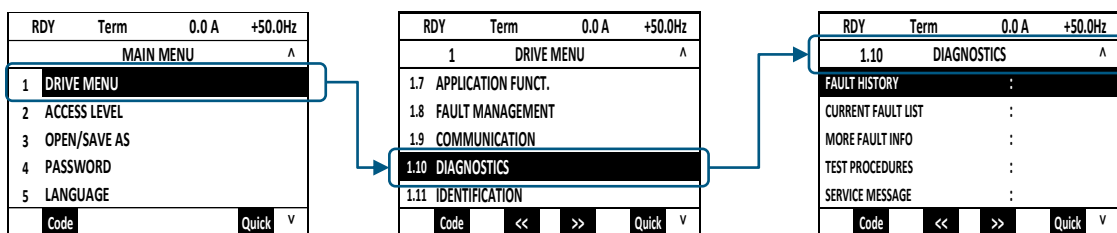


For the full list of error codes, consult the Altivar 71 Programming Manual on the Schneider Electric website.

Excerpt from fault code list.

OCF	Overcurrent.
ILF	internal com. link. Communication fault between option
SOF	Overspeed. Instability or driving load too high
OBF	Overbraking. Braking too sudden or driving load
OLF	Motor overload. Triggered by excessive motor current
CFF	Incorrect config.
PHF	Input phase loss
USF	Undervoltage

Detailed information on the current fault and the saved faults are displayed in the frequency converter's "DIAGNOSTICS" menu. This menu can be viewed from an access level of "Standard", which can be configured under "MAIN MENU" → "ACCESS LEVEL".



NOTICE



FAULT REQUIRING RESTART

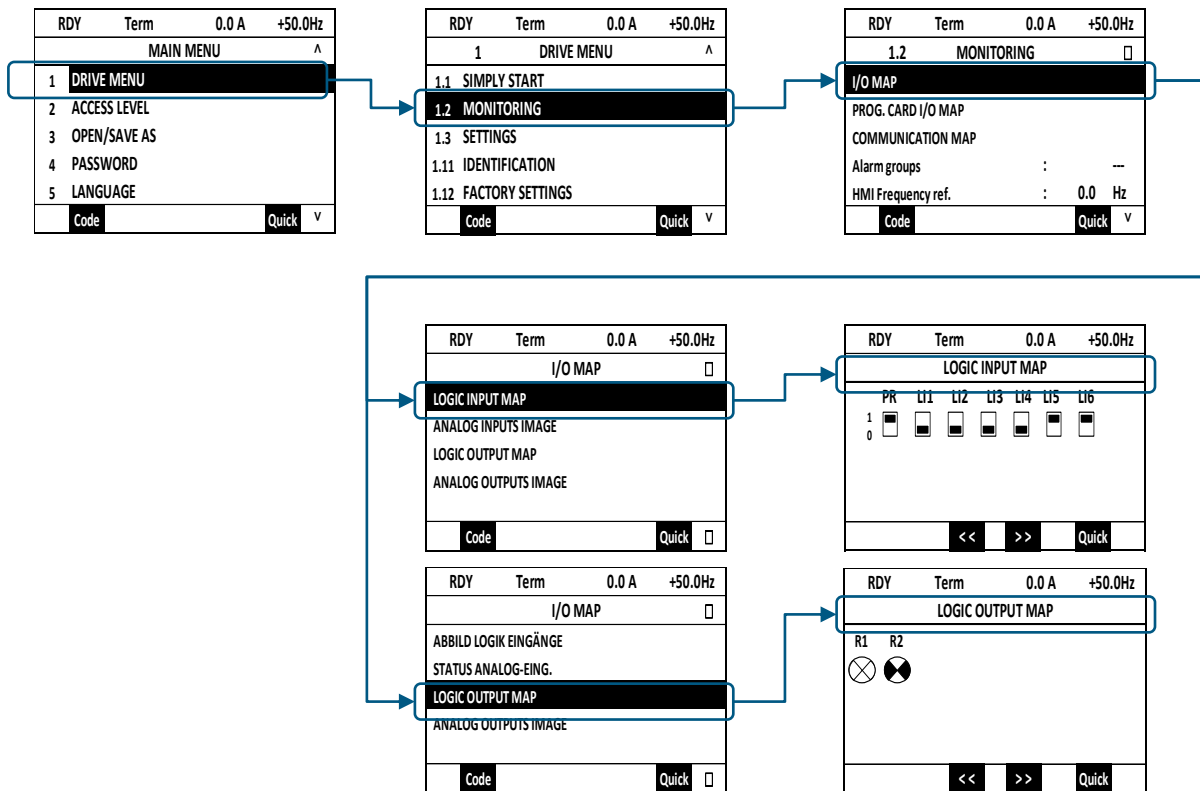
- ▶ Some faults do not allow automatic resetting. They can only be resolved if the equipment is switched off and back on again. For further information, consult the manufacturer’s Programming Manual for the ATV71, section “Faults – Causes – Remedies”.

9.5.3 Input and output status

During commissioning or troubleshooting, check the setting of the input and output signals. This allows fast checking of which signals are set by the higher-level control system and which signals are sent to the higher-level control system.

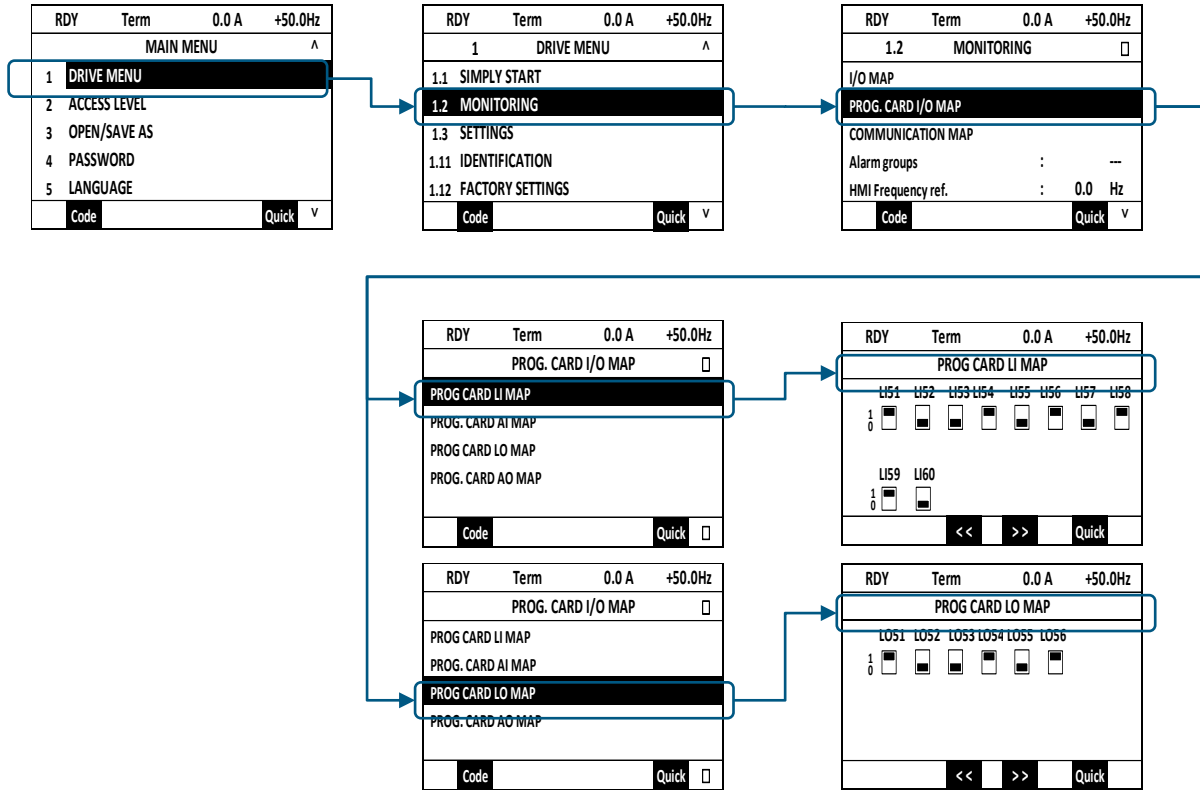
The current status of the frequency converter’s inputs and outputs are displayed in the menu “MONITORING” → “I/O MAP”.

How to navigate to the menus “LOGIC INPUT MAP” and “LOGIC OUTPUT MAP”:



The current status of the ATV-IMC card's inputs and outputs are displayed in the menu "MONITORING" → "PROG. CARD I/O MAP".

How to navigate to the menus "PROG CARD LI MAP" and "PROG CARD LO MAP":



9.5.4 Wiring

Based on the status of the frequency converter's input and output signals and the higher-level control system's input and output signals, it is easy to determine whether a wiring fault exists.

The position sensor should be connected directly to the converter, as equipment connected in between may disrupt or delay the signal, which can result in the rotary table stopping outside the resting phase.

Make sure that the signal cables have been wired in accordance with EMC standards and are connected. The incorrect layout and/or wiring of control cables can result in voltages being induced, which can lead to unintended operation of the rotary table by the Taktomat Indexing Controller.

10 Technical data

10.1.1 Taktomat indexing controller dimensions

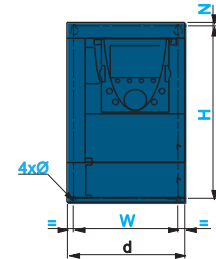
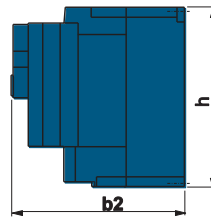
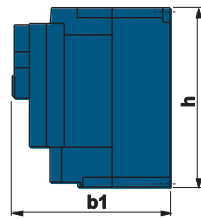
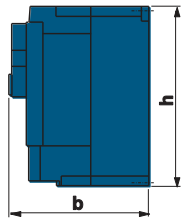
ATV 71...M3, ATV 71HD11M3X, HD15M3X, ATV 71H075N4...HD18N4

No additional card

1 additional card

2 additional card

Front view



ATV 71H	d [mm]	h [mm]	b [mm]	b1 [mm]	b2 [mm]	W [mm]	H [mm]	N [mm]	Ø [mm]	Gewicht [kg]
O37M3...U15M3, 075N4...U22N4	130	230	175	198	221	113,5	220	5	5	3,0
U22M3...U40M3, U30N4, U40N4	155	260	187	210	233	138	249	4	5	4,0
U55M3, U55N4, U75N4	175	295	187	210	233	158	283	6	5	5,5
U75M3, D11N4	210	295	00,	0,3	026	060	283	6	6	7,0
D11M3X, D15M3X, D15N4, D18N4	230	400	213	236	259	210	386	8	6	22,0

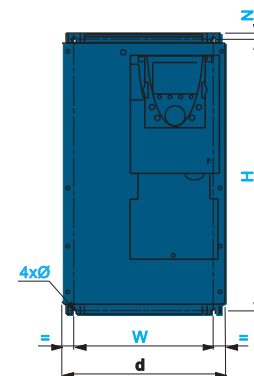
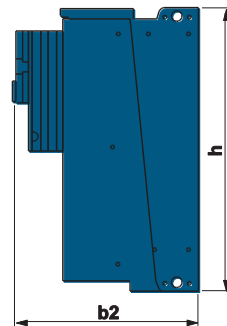
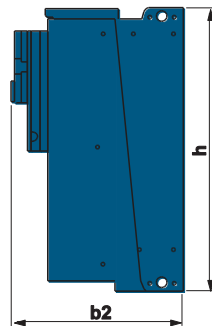
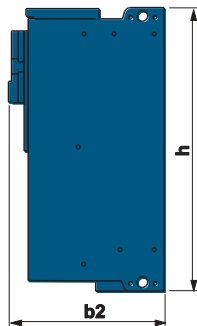
ATV 71HD18M3X...45M3X, ATV 71HD22N4...HD37N4, ATV 71HU22Y...HD30Y

No additional card

1 additional card

2 additional card

Front view



ATV 71H	d [mm]	h [mm]	b [mm]	b1 [mm]	b2 [mm]	W [mm]	H [mm]	N [mm]	Ø [mm]	Gewicht [kg]
D18M3X, D22M3X, D22N4,U22Y...D30Y	240	420	236	259	282	206	403	10	6	30,0
D30N4, D37N4	240	550	266	289	312	206	529	10	6	37,0
D30M3X...D45M3X	320	550	266	289	312	280	524	10	9	37,0

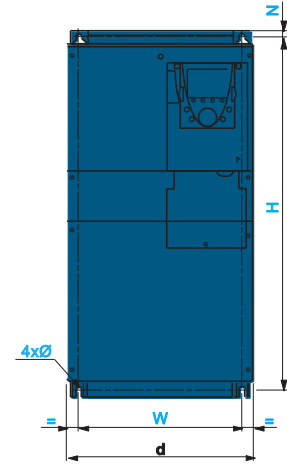
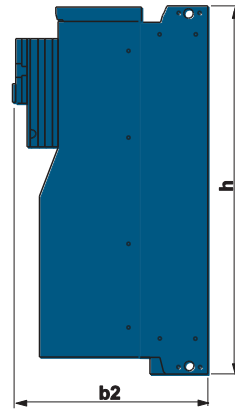
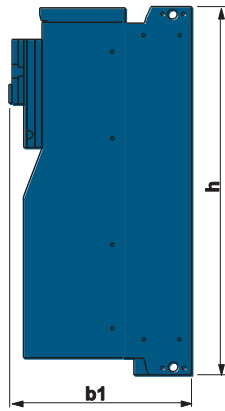
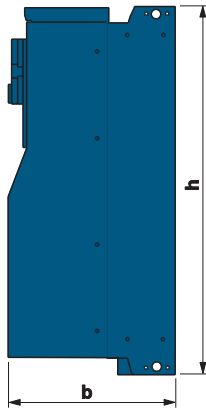
ATV 71HD45N4...HD75N4, ATV 71HD37Y...HD90Y

No additional card

1 additional card

2 additional card

Front view



ATV 71H	d	h	b	b1	b2	W	H	N	Ø	Gewicht
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
D45N4...HD75N4	320	630	290	313	334	280	640,5	10	9	44,0
D37Y...HD90Y	320	630	290	313	334	280	640,5	10	9	68,0

11 Transport

11.1 Safety information

NOTICE



Damage arising from improper transport!

Improper transport can cause significant damage to property.

- ▶ Take care and take note of the symbols on the packaging when unloading the machine on delivery and when transporting it on the premises.

11.2 Transport inspection

Immediately on receipt, check to make certain that the delivery is complete and has not been damaged during transport:

Proceed as follows if there are visible signs of damage during transport:

- ▶ Do not accept the delivery or only do so conditionally.
- ▶ Record the extent of the damage on the transport documentation or on the associated delivery note.
- ▶ Immediately report any damage to the manufacturer of the machine.

⚠ DANGER



Risk of fatal injury from suspended loads and falling parts!

Parts can fall during transport and cause serious or fatal injury.

- ▶ Do not walk under suspended loads.
- ▶ Keep people clear of the danger zone.
- ▶ Always use lifting gear with a sufficient load capacity.
- ▶ Always use forklift trucks or pallet trucks with a sufficient load capacity and fork length.
- ▶ Do not leave the load suspended if you leave the working area.

11.3 Packaging, handling, unpacking

The Taktomat indexing controller is packed in plastic sheeting or cardboard packaging and secured to a pallet for transportation.

NOTICE



Damage arising from improper transport!

Improper transport can cause significant damage to property.

- ▶ The machine must not be allowed to become wet while it is being transported.
- ▶ Take the machine out of the packaging just before installation

- ▶ Remove the packaging carefully and dispose of it with due regard to environmental considerations.

11.4 Installation location, place of use

The Taktomat indexing controller should be stored and set up under the following conditions:

- ▶ Do not store the system in the open
- ▶ Store the Taktomat indexing controller in a dry room at a temperature above 8°C
- ▶ Do not expose the system to any aggressive agents

12 Mechanical installation

12.1 Installation orientation

The Taktomat indexing controller is designed for vertical wall mounting.

12.2 Installation

For guidelines on installing and cooling the Taktomat indexing controller, consult the documentation provided by the frequency converter manufacturer. The stipulated air direction for air cooling must be complied with. Consequently, the equipment must only be operated in the stipulated orientation (e.g. vertically). The Taktomat indexing controller must be protected against excessive stress. Do not bend any components and do not change any insulation clearances. For electrostatic reasons, do not touch any electronic components or contacts.

13 Electrical installation

13.1 Safety information

Personal: qualified staff

DANGER



Risk of death by electrocution!

There is an immediate risk of fatal injury due to electric shock if live components are touched.

Damage to the insulation or to individual components can cause fatal injury.

- ▶ Only allow work on the electrical system to be carried out by qualified electrical engineers.
- ▶ In the event of damage to the insulation, immediately shut off the power supply and initiate a repair.
- ▶ Before starting work on active parts of the electrical system or equipment, ensure that it is completely powered down and cannot be switched on again.

WARNING



UNINTENDED EQUIPMENT OPERATION

Voltages induced in the Taktomat Indexing Controller's control cabling by electrical and electronic components may cause unintended operation of the system.

This can cause death, serious injury or equipment damage.

13.2 Electrical connection

Electrical regulations must be observed during installation. For further information, consult these Operating Instructions and the manufacturer's operating instructions. The instructions for EMC-compliant installation e.g. shielding, filter layout and cable wiring must be observed. This also applies to items of equipment with the CE label. The manufacturers of systems and machines are responsible for complying with EMC limits.

CAUTION



CONNECTION LINE POWER

Before switching on and configuring the frequency converter, ensure that the line power is compatible with the supply voltage range shown on the converter rating plate. The frequency converter may get damaged if the line voltage is not **compatible**.

Failure to follow this instruction can result in equipment damage.

It may be necessary to implement additional monitoring and protective equipment for specific systems in compliance with safety and accident prevention regulations. The frequency converter's hardware is not permitted to be modified in any way unless otherwise intended by the manufacturer of the electrical components of the Taktomat Indexing Controller.

CAUTION



DAMAGE TO ELECTRICAL OR ELECTRONIC COMPONENTS!

Observe the connection voltage of three-phase motors! The motors must be connected in accordance with the motor output voltage of the frequency converter in the corresponding motor coil circuit.

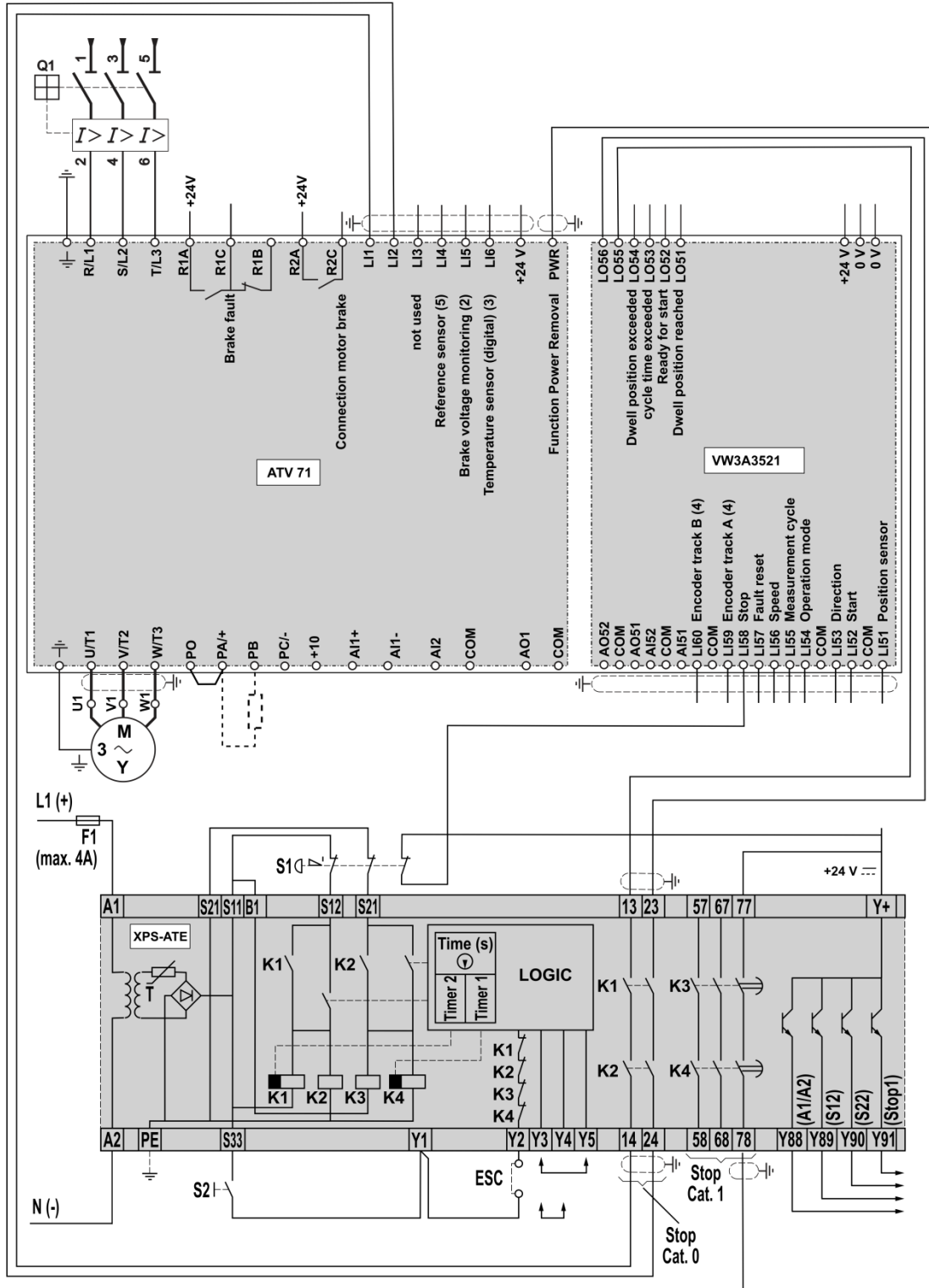
NOTICE



PWR INPUT "POWER REMOVAL"

- ▶ The cable shield connected to the "Power Removal" input must be connected to earth

13.3.2 TIC circuit diagram recommendation with personal safety stop safety relay



- (1) Coax. standard cable, type RG174/U in accordance with MIL-C17 or KX3B in accordance with NFC93-550, external diameter 2.54 mm, length max. 15 m.
The cable shield **must be** connected to earth.
For a more detailed description of the "Power Removal" function, see the original documentation for the Altivar 71 Frequency Converter.

- | | |
|-----|--|
| (2) | For motor brakes with 24 V DC coil voltage, a bridge must be made to R2A.
For motor brakes with other coil voltages, or for operation without a brake, this input must be hard-wired with +24 V. In this case, braking voltage monitoring is not possible. |
| (3) | Only digital temperature sensors (thermoclick) are monitored. Analogue thermo sensors cannot be analysed.
When using analogue thermo sensors or for operation without thermo sensors, this input must be hard-wired with +24 V. In this case, temperature monitoring is not possible. |
| (4) | Only on rotary tables with a "Pitch error compensation" option. On all other rotary tables and stepping gears, these two inputs are left blank. |
| (5) | Only on rotary tables with a "Pitch error compensation" option. On all other rotary tables and stepping gears, this input is left blank. |

⚠ CAUTION



MAXIMUM RELAY POWER RATING

R1A/R1B/R1C and R2A/R2C relay maximum switching capacity:

ohm load: 5 A at 250 V AC or 30 V DC

inductive load ($\cos \phi = 0.4$ L/R = 7 ms): **2 A** at 250 V AC or 30 V DC

For further information see manufacturer's original documentation "ATV71 installation manual 0.37 – 90 kW".

Failure to follow this instruction can result in equipment damage

NOTICE



PWR INPUT "POWER REMOVAL"

- ▶ The cable shield connected to the "Power Removal" input must be connected to earth

14 Troubleshooting

14.1 Safety information

DANGER



Risk of death by electrocution!

There is an immediate risk of fatal injury due to electric shock if live components are touched.

Damage to the insulation or to individual components can cause fatal injury.

- ▶ Only allow work on the electrical system to be carried out by qualified electrical engineers.
- ▶ In the event of damage to the insulation, immediately shut off the power supply and initiate a repair.
- ▶ Before starting work on active parts of the electrical system or equipment, ensure that it is completely powered down and cannot be switched on again.

WARNING



Risk of injury from improper troubleshooting!

Improper troubleshooting can cause serious injury to staff and material.

- ▶ Before starting work ensure that there is sufficient room to carry out the work.
- ▶ Pay attention to tidiness and cleanliness in the working area! Loose parts and tools which are piled up or lying around are sources of accidents.

14.2 Fault-Cause-Remedy

Fault	Help
The frequency converter displays "ILF"	<ul style="list-style-type: none"> • Communication fault between ATV-IMC card and frequency converter
The frequency converter displays "NLP"	<ul style="list-style-type: none"> • No line power present on L1, L2 & L3 input terminals • No line power present on L1, L2 & L3 input terminals and "not measurable" is displayed in menu "1. Frequency converter menu" → "1.2 Monitoring" → "Line power". If so, the frequency converter may be defective. Contact Taktomat GmbH.
Rotary table overshoots the position	<ul style="list-style-type: none"> • If the frequency converter displays the status code "OCF", this means the load is too large. (add a dynamic braking option). • Parameter "K filt P drv speed" set to 0. Modify this parameter. See section "Frequency converter menu "SETTINGS"". • The INI signal is delayed by electronic components connected in between • The time in parameter "DEC 1 Auto" or "DEC 2 Auto" is set too high. • The "Overtravel" function is activated. The "measurement run" has not been performed after changing the speed.
The rotary table sporadically stops moving	<ul style="list-style-type: none"> • Signal level on terminal LI58 ("Stop") briefly breaks off. Check signal using oscilloscope.
The frequency converter loses set parameters after restart	<ul style="list-style-type: none"> • The frequency converter may be defective. Contact Taktomat GmbH.

15 Disposal

At the end of its service life, the Taktomat indexing controller must be disassembled and disposed of in accordance with environmental protection requirements.

15.1 Disassembly



! DANGER

Risk of death by electrocution!

There is an immediate risk of fatal injury due to electric shock if live components are touched.

Damage to the insulation or to individual components can cause fatal injury.

- ▶ Only allow work on the electrical system to be carried out by qualified electrical engineers.
- ▶ In the event of damage to the insulation, immediately shut off the power supply and initiate a repair.
- ▶ Before starting work on active parts of the electrical system or equipment, ensure that it is completely powered down and cannot be switched on again.

Before starting disassembly:

- ▶ Disconnect all power supplies to the machine and ensure that it cannot be reconnected.
- ▶ Disassemble assemblies and components, observing any local environmental protection regulations.

15.2 Disposal

- ▶ If no return or disposal agreement has been concluded, dispose of the components in a recycling facility after they have been properly disassembled.
- ▶ Scrap metal parts.

16 Spare part and wear part

Spare part must meet the manufacturer's technical specifications. This is always ensured if original Spare part are used.

16.1 Spare part and wear part Type TIC

Spare part and wear part of the product Taktomat indexing controller are basically order specific. To accelerate the order process of the Spare part and wear part, we need the following information which is located on the rating plate: Item number of the machine.

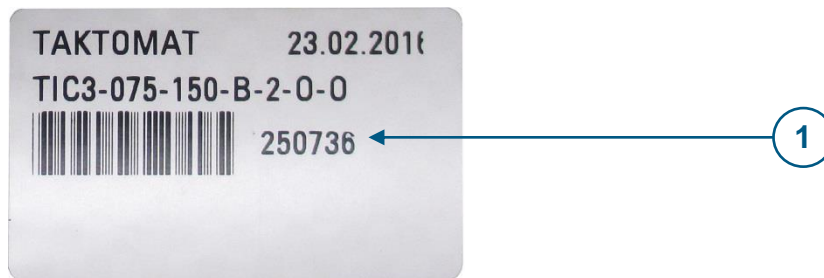


Figure 7 Example Rating plate

Position (1) Item number

16.2 TIC spare parts

Component	Model	Article number
Frequency converter	ATV71H075N4	250538
Frequency converter	ATV71HU15N4	250539
Frequency converter	ATV71HU22N4	250540
Frequency converter	ATV71HU30N4	250541
Frequency converter	ATV71HU40N4	250542
Frequency converter	ATV71HU55N4	250543
Frequency converter	ATV71HU75N4	250544
Frequency converter	ATV71HD11N4	250545
Frequency converter	ATV71H037M3	250529
Frequency converter	ATV71H075M3	250530
Frequency converter	ATV71HU15M3	250531
Frequency converter	ATV71HU22M3	250532
Frequency converter	ATV71HU30M3	250533
Frequency converter	ATV71HU40M3	250534
Frequency converter	ATV71HU55M3	250535
Frequency converter	ATV71HU75M3	250536
Frequency converter	ATV71HD11M3X	250537
ATV-IMC card	VW3A3521S0	250273
Graphic display terminal	VW3A1101	250401
Safety relay	XPS ATE3710	320860