

Protect^{IT} – MNS Motor Management INSUM[®]

MPU - Multi Purpose Unit User's Guide



ABB



INSUM[®] Multi Purpose Unit
User's Guide

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1 General

1.1 Introduction

The INSUM[®] Multi-Purpose-Unit (MPU) is designed to automatically restart motors after a voltage dip of the mains power supply which might be necessary due to different process reasons.

The MPU is measuring the duration of a voltage dip and reacts depending on this measured time, i.e. perform an immediate automatic restart, a delayed restart or no automatic restart.

Also there are two different modes of restart-function available :

1. ERM – Mode :

The MPU is performing the automatic restart of a motor after a voltage dip depending on the duration.

2. TDRM – Mode :

The MPU is performing the automatic restart of a motor after a voltage dip depending on the duration, but only if the input "Auto-ON" is activated.

Both functions, ERM and TDRM, are independent from each other. The function can be selected via a selector switch.

The MPU device is supporting two motor starter types :

- NR-DOL/RCU (Non Reversing Direct Online Starter, RCU)
- Rev-DOL/RCU (Reversing Direct Online Starter, RCU)

The MPU automatically detects the starter type and restarts the motor in that rotation direction the motor was spinning before the voltage dip occurred.

Note : In case the MPU is used in combination with the INSUM Motor Control Unit (MCU) the automatic restart function has to be disabled in MCU.

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Notes:

1.2 Functional schematic

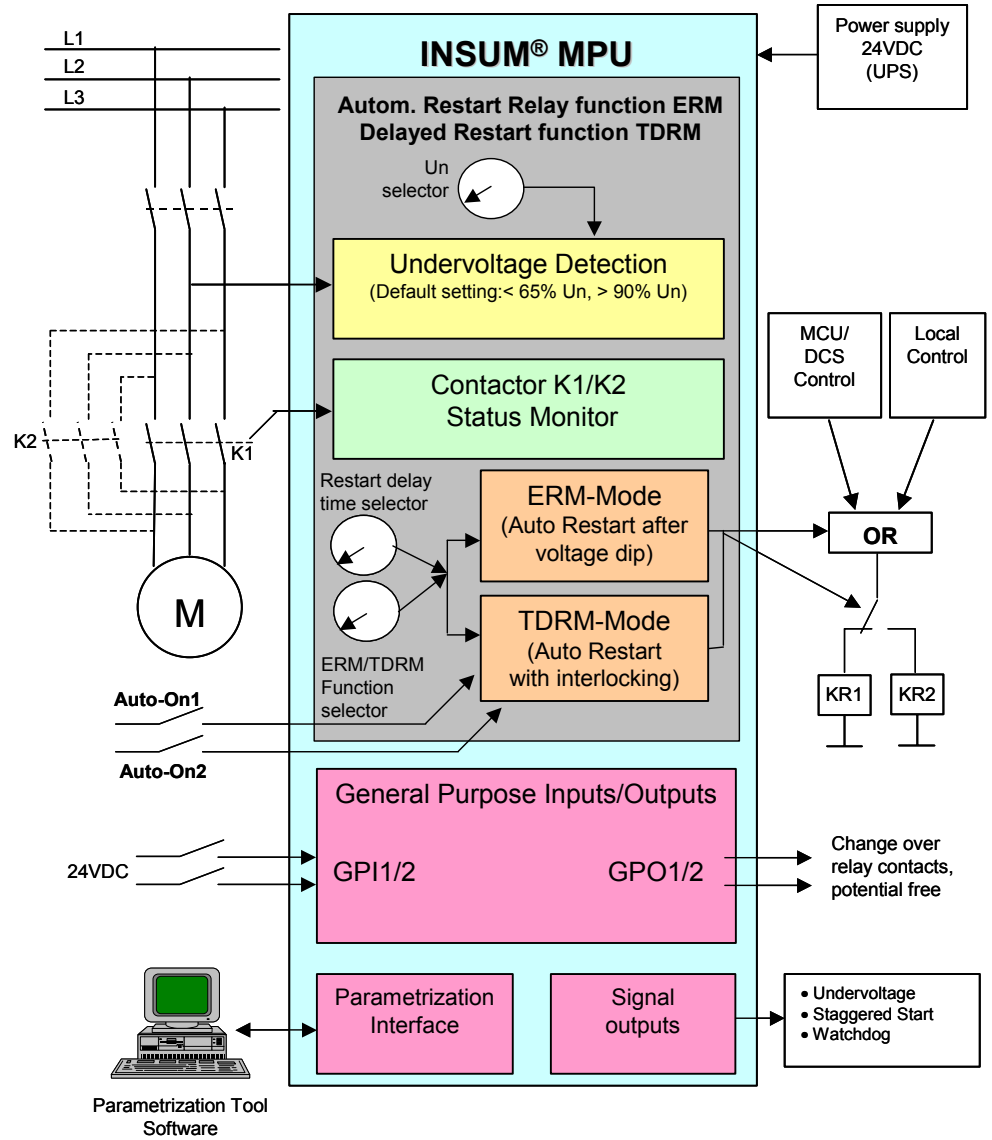


Figure 1. Functional schematic

Notes:

2 Functional description of MPU

The Auto-Restart function is splitted into 5 different sections :

1. Undervoltage detection (chapter 2.1)
3. Contactor Status Monitor (chapter 2.3)
4. Contactor control ERM / TDRM Mode (chapter 2.4)
5. Signal outputs (chapter 2.5)
6. Programming Interface (chapter 2.6)

2.1 Undervoltage detection

The MPU is detecting a voltage dip, if the measured phase voltage drops below an adjustable "Undervoltage-Detection-Level" (UDL).

Default setting for this UDL-level is 65% of the parametrized nominal voltage level U_n .

The MPU is detecting a voltage restored situation, if the measured phase voltage raises above the adjustable "Voltage-Restoration-Level" (VRL).

Default setting for this VRL-level is 90% of the parametrized nominal voltage level U_n .

The minimum detection time for a voltage dip is 8ms. Voltage dips shorter than 8ms are not detected.

In the following example the MPU will detect a voltage dip after $T_1 > 8\text{ms}$ and a voltage restore after T_2 .

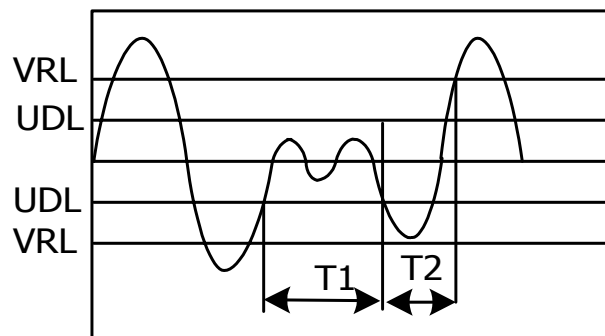


Figure 2. Undervoltage detection

Note : The parameter for the nominal phase voltage can be set with a manual selector switch (see also chapter 5.3).

2.2 Voltage Measurement

Base of the detection of voltage dips is the MPU internal measurement of a single phase voltage (U_n).

The phase voltage is measured between one of the three line phases (L1/L2/L3) and N (Neutral).

It is recommended to measure the contactor control voltage.

2.3 Contactor and Auto-On1/2 Status Monitor

To inhibit the automatic restart function the MPU is monitoring the status of the main contactors (K1 / K2 in *figure 1*). This means that the auto restart function is disabled as long as both main contactors are not closed (means motor is stopped). If one of the contactors is closed, the restart function is enabled.

The MPU is measuring the contactor coil voltage to monitoring the contactor status :

$U_{\text{cont.coil}} < 30\% \times U_n$ = Contactor status is : OPEN
 $U_{\text{cont.coil}} > 60\% \times U_n$ = Contactor status is : CLOSED

(U_n is the contactor control voltage)

Notes:

2.4 Contactor Control

The following chapters describe the MPU operation depending on the selected operating mode ERM or TDRM in detail.

The selection of ERM/TDRM mode is done via a selector switch. The selector switch is located on the bottom of the Main Unit. To access this switch, the Main Unit has to be removed from the Base Plate.

2.4.1 ERM-Mode :

The reaction of the MPU Auto Restart function depends on the length of the undervoltage dip and the number of voltage dips within a certain time.

The following cases show the different reactions of the MPU in different voltage dip situations.

Prerequisite for the shown cases is :

- Contactor K1 or K2 is closed (KR1/KR2 is energized; indication for MPU via coil voltage).

AND

- ERM-Mode is selected (LED indication)

The relay contacts KR1/2 are pulse controlled with a pulse length of 1s.

2.4.1.1. Case 1 : Voltage dip < 200ms

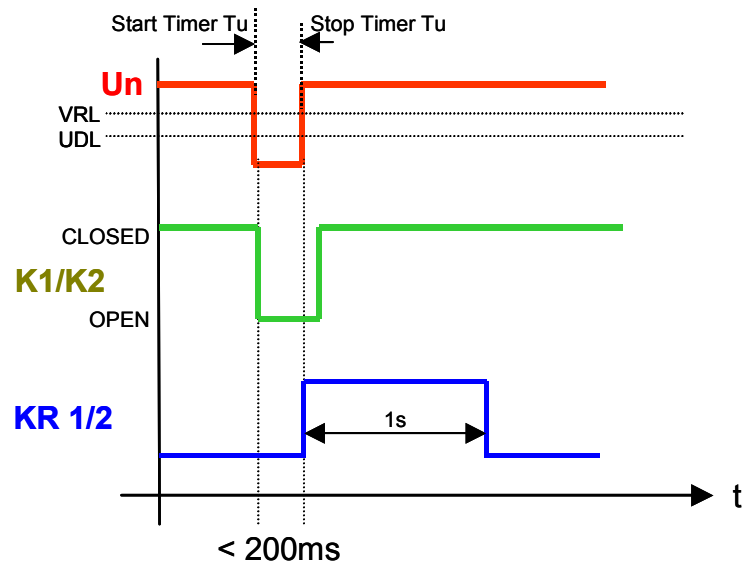


Figure 3. Restart function; ERM Mode - Case 1

MPU reaction : Automatic restart immediately after voltage restoration ($U_n > V_{RL}$)

Notes:

2.4.1.2. Case 2 : 200ms < dip < Trestart (default : 4s)

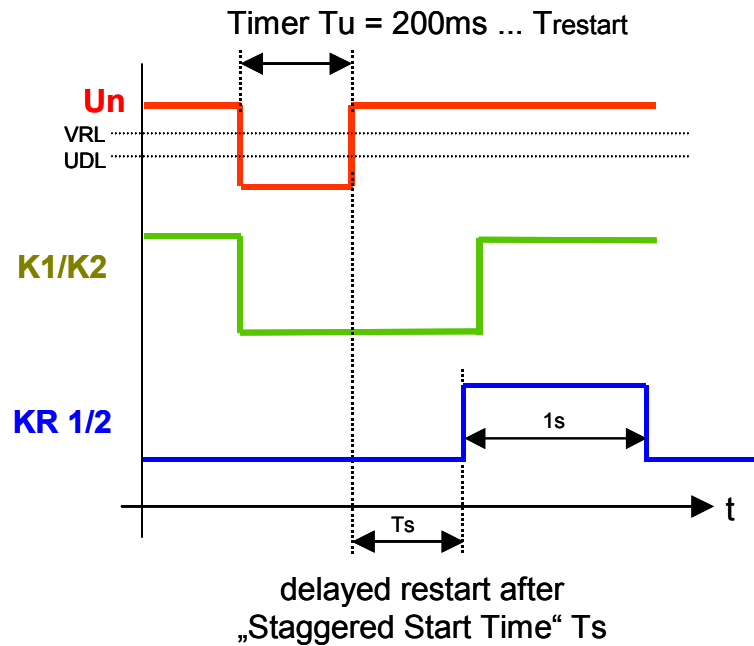


Figure 4. Restart function; ERM Mode – Case 2

MPU reaction : Automatic delayed restart after voltage restoration ($U_n > V_{RL}$) **AND** after **Staggered Start Time T_s** (see also chapter 5.2 for settings) has expired.

Note : The time **Trestart** can be changed via parametrization software.
Default setting = 4s.

2.4.1.2.1 Mains voltage interruption during Staggered-Start-Time

It can happen, that during the Staggered Start Time (T_s) is not elapsed (case 2.4.1.2) a further voltage dip occurs.

In this case the MPU is reacting in the following way :

- $T_u < 0,2\text{s}$ Timer T_s is stopped but **NOT cleared** !
After voltage restoration the timer T_s continues running until T_s time is elapsed.
- $0,2\text{s} < T_u < T_{\text{restart}}$ Timer T_s is stopped AND resetted. The complete "Staggered Start" procedure (case 2.4.1.2) is restarted.
- $T_u > T_{\text{restart}}$ No automatic restart is executed (case 2.4.1.3)

Notes:

2.4.1.3. Case 3 : Dip > Trestart (default: 4s)

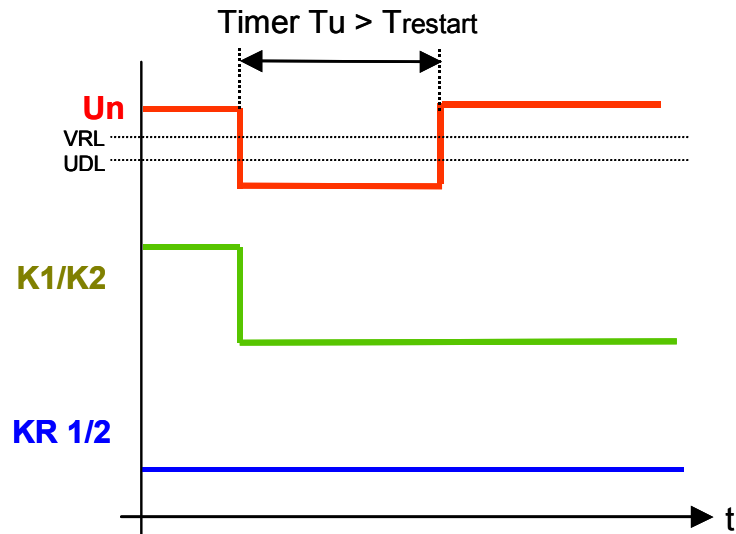


Figure 5. Restart function; ERM Mode – Case 3

MPU reaction : No automatic restart after voltage restoration ($U_n > V_{RL}$).
K1/K2 remains off until a new start command (e.g. via MCU) is issued.

Note : The time **Trestart** can be changed via parametrization software.
Default setting = 4s.

2.4.1.4. Case 4 : 2x dip < 200ms within 1s

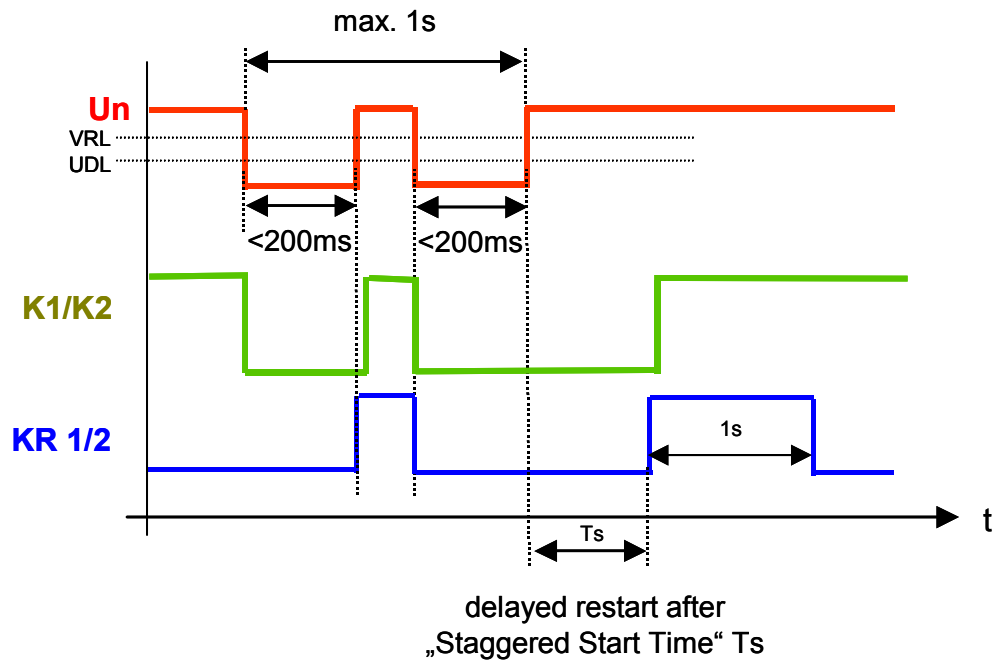


Figure 6. Restart function; ERM Mode – Case 4

MPU reaction : Automatic delayed restart after second voltage restoration ($U_n > V_{RL}$) **AND** after **Staggered Start Time Ts** (see also chapter 5.2 for settings) is expired.

Note : The relay KR1/2 is resetted after the second voltage dip (within this 1s) is detected.

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2.4.2 TDRM Mode

If the MPU is switched into TDRM operating mode the device is restarting the motor depending on the length of the voltage dip and the status of the "Auto-On (1/2)" inputs.

Prerequisite for the shown cases is :

- TDRM-Mode is selected (LED indication)

The relay contacts KR1/2 are pulse controlled with a pulse length of 1s .

2.4.2.1. Case 1 : Voltage dip < 200ms

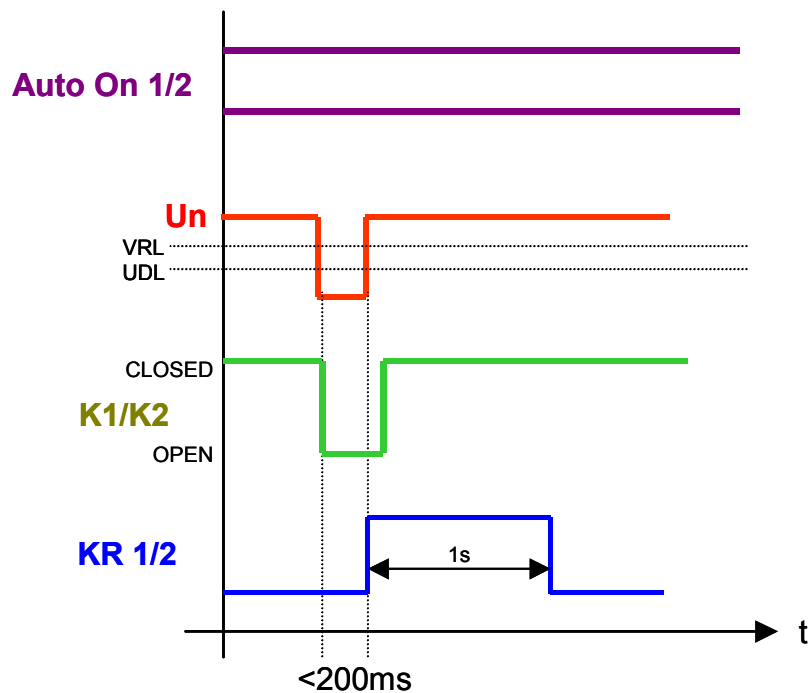


Figure 7. Restart function; TDRM Mode – Case 1

MPU reaction : Automatic restart immediately after voltage restoration ($U_n > VRL$), **independent** of status of "Auto-ON" input !

Notes:

2.4.2.2. Case 2 : dip > 200ms

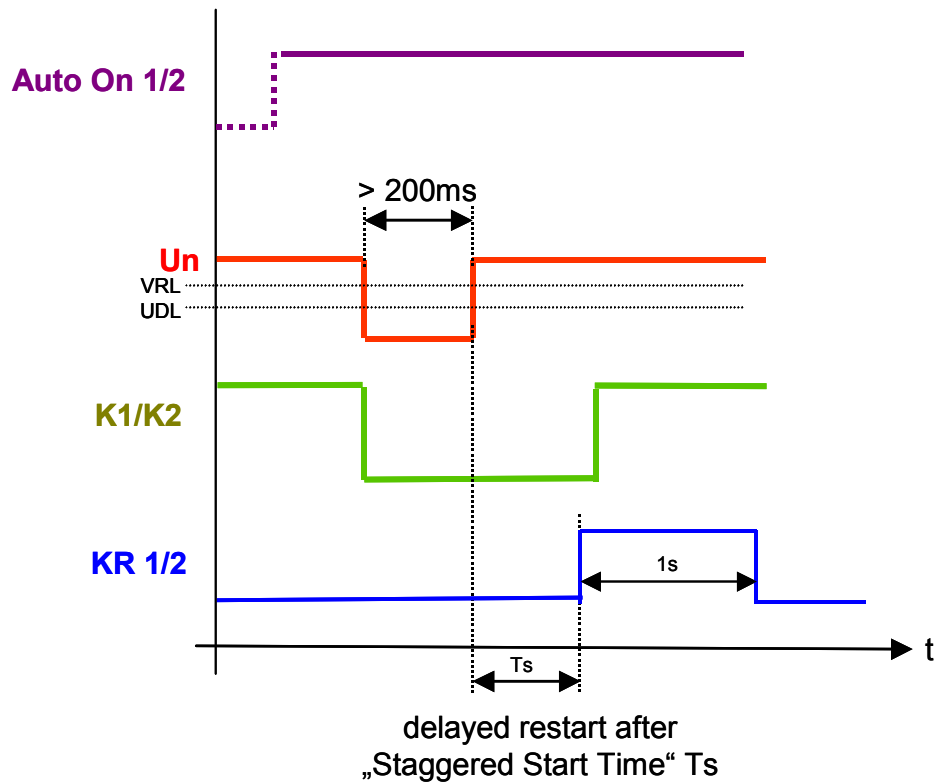


Figure 8. Restart function; TDRM Mode – Case 2

MPU reaction : Automatic delayed restart after voltage restoration ($U_n > VRL$) **AND** after **Staggered Start Time T_s** (see also chapter 5.2 for settings) is expired **AND** correct Auto-ON (1/2) input is set.

Mains voltage interruption during Staggered-Start-Time T_s

It can happen, that during the Staggered Start Time (T_s) is not elapsed (case 2.4.2.2), a further voltage dip occurs.

In this case the MPU is reacting in the following way :

- $T_u < 0,2s$ Timer T_s is stopped but **NOT cleared** !
After voltage restoration the timer T_s continues running until T_s time is elapsed.
- $T_u > 0,2s$ Timer T_s is stopped **AND** resetted. The complete "Staggered Start" procedure (case 2.4.2.2) is restarted.

Notes:

2.5 Signal output contacts / General Purpose Inputs/Outputs GPI/GPO

The MPU provides potential free signal output relay contacts (change over contacts) to indicate different status of the MPU function.

Additionally the MPU provides two General Purpose Inputs with 2 dedicated potential free general purpose output relays (change over contacts).

- Signal output : "Undervoltage"

If the voltage level drops below the UDL and the contactor was switched ON, this output relay contact is activated.

The relay is activated as long as the the voltage is below UDL value.

- Signal output : „Staggered Start activated“

If the Auto-Restart function activates the Staggered Start-Timer after a voltage dip (Case 2 and 4) this output relay is activated.

The relay is activated as long as the staggered start time is not elapsed, but at least 500ms.

- Signal output : „Watchdog“

The internal microprocessor is supervised via a watchdog. During normal operation the relay coil is energized. In case of an "internal fault" of the MPU the relay coil is deenergized.

The MPU fault trip can be resetted by switching off/on the power supply of the device.

- General Purpose Input GPI1/2 and Output GPO1/2

The target of the General Purpose Inputs and Outputs is to have the possibility to electrical isolate 24VDC signals. There is an internal 1:1 relation between the inputs and outputs :

If GPI1 is activated, GPO1 relay is also activated (change over contacts).

If GPI2 is activated, GPO2 relay is also activated (change over contacts).

2.6 Programming Interface

The MPU provides a serial link programming interface for optional parametrization. A programming software tool is available to change the parameters.

The interface is located on the top of the Main Unit. The changed parameters of the MPU are stored in non-volatile Flash memory.

A description of the programming software tool can be found in the related document "1TGC901012M0201_MPU Parametrization Tool"

The following parameters scan be parametrized via this interface :

Description	Range	Step	Default setting
Undervoltage-Detection-Level (UDL)	0 - 99% x Un	1%	65%
Voltage-Restoration-Level (VRL)	0 - 100% x Un	1%	90%
Max. duration of voltage dip for delayed restart (Trestart)	0 – 120s	1s	4s
Staggered Start Delay Time (Ts)	0 – 1200s	1s	5s

- Note :**
1. The UDL level has always to be lower than the VRL level.
 2. If the selector switch "Ts" is in position "F" the MPU will use the software setting for these parameter.

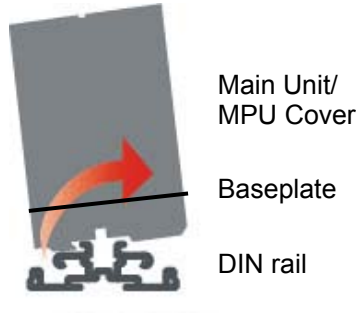
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3 Mechanical Structure

The MPU consists of the parts Baseplate, Main Unit and MPU Cover.



3.1 Baseplate

The Baseplate is mechanically fixed to the drawer mounting DIN-rail or can be fixed with screws. All external wires are connected to the terminals of the Baseplate (max. 1,5 mm²).

3.2 Main Unit

The Main Unit contains the electronic components of the MPU unit. The Main Unit is plugged to the Baseplate. The Main Unit can be replaced if power supply and voltage measurement is connected and switched on (life insertion).

3.3 Cover

In case only the Baseplate is mounted and the cables are connected (preliminary setup) the terminals can be covered using a special MPU Cover.

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4 Wiring Schematic and Terminal Description

4.1 Wiring schematic

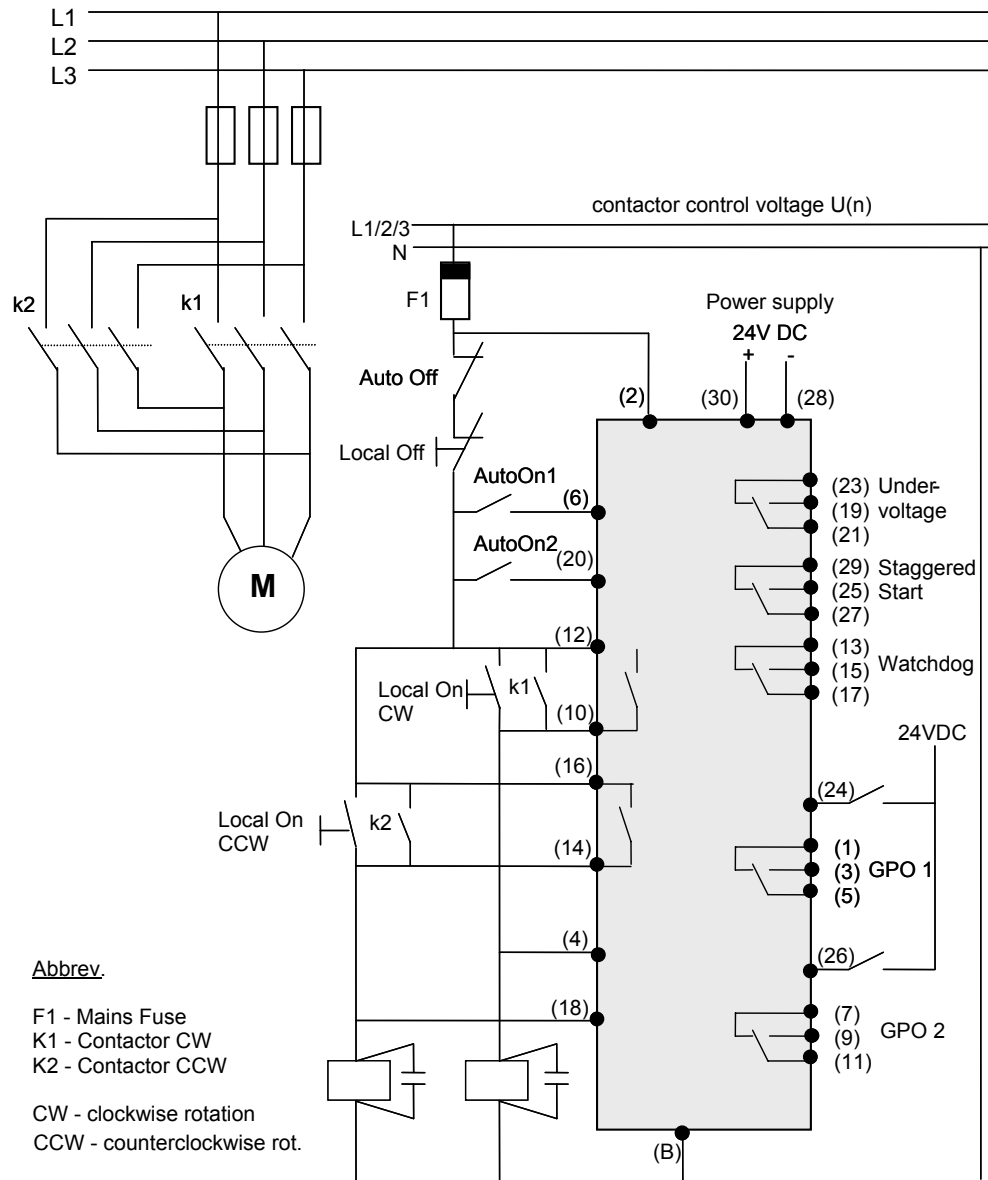


Figure 9. Wiring schematic

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4.2 Terminal description

Description	MPU Terminals		Description
Output General Purpose GPO1 Relay common	1	<u>2</u>	Voltage Monitor In (Phase)
Output General Purpose GPO1 Relay opening contact	3	<u>4</u>	Contactors Coil Voltage (CW = K1) = Feedback CW
Output General Purpose GPO1 Relay closing contact	5	<u>6</u>	Auto ON 1
Output General Purpose GPO2 Relay common	7	<u>B</u>	Voltage Monitor Neutral
Output General Purpose GPO2 Relay opening contact	9	<u>10</u>	Contactors Control Relay Output (CW)
Output General Purpose GPO2 Relay closing contact	11	<u>12</u>	Contactors Control Relay Output (CW)
Output "Watchdog" Relay common	13	14	Contactors Control Relay Output (CCW)
Output "Watchdog" Relay opening contact	15	16	Contactors Control Relay Output (CCW)
Output "Watchdog" Relay closing contact	17	18	Contactors Coil Voltage (CCW = K2) = Feedback CCW
Signal Output "Undervoltage" (MR1) Relay closing contact	19	20	Auto ON 2
Signal Output "Undervoltage" (MR1) Relay common	21	22	NC
Signal Output "Undervoltage" (MR1) Relay opening contact	23	24	General Purpose Input GPI 1 (24VDC)
Signal Output "Staggered Start active" Relay closing contact	25	26	General Purpose Input GPI 2 (24VDC)
Signal Output "Staggered Start active" Relay common	27	28	Power Supply -24V DC
Signal Output "Staggered Start active" Relay opening contact	29	30	Power Supply +24V DC

	Voltage level =max. 400V
	Voltage level = max. 230V
	Voltage level = 24V
NC	Not Connected

Note : Maximum wire diameter for terminals: 1,5 mm²

Notes:

5 Selector Switch settings

5.1 ERM/TDRM Mode Selector Switch

The selector switch for ERM/TDRM operating mode is located on the PCB board of the Main Unit and is not accessible from outside.

To access this switch the Main Unit has to be removed from the Baseplate :

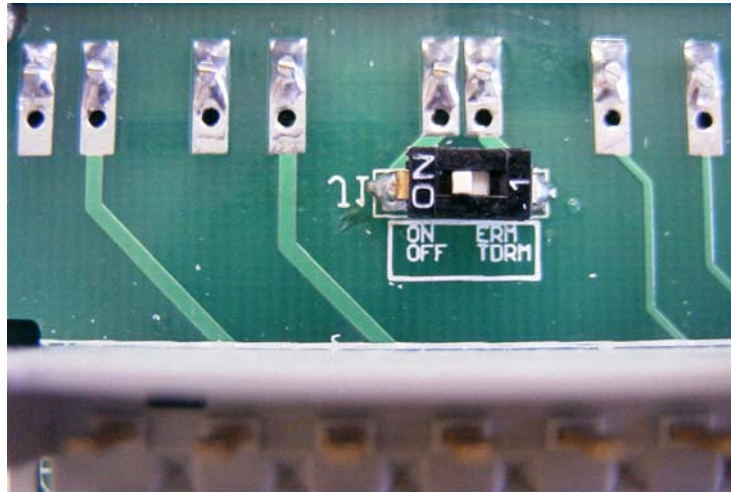


Figure 10. ERM/TDRM Mode Selector Switch

Switch settings :

MODE	DIP SWITCH	LED INDICATOR
TDRM	OFF	GREEN
ERM	ON	RED

The operating mode ERM/TDRM is indicated with LEDs on the top side of the MPU Main Unit.

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5.2 Staggered Start delay time selector switch Ts

The staggered start delay timer is activated if voltage has been restored (e.g. $U > 90\% \times U_n$) after a voltage dip.

After this delay time the MPU is restarting the motor in the direction the motor was spinning before the voltage interruption.

Switch settings :

Ts/s	Switch Pos.
Invalid	0
1	1
2	2
5	3
10	4
15	5
20	6
25	7
30	8
35	9
40	A
45	B
50	C
55	D
60	E
Software Set	F

Note : If selector switch is in Pos. F, the MPU is using the parameters which are adjusted with the parametrization tool (ref. to chapter 2.6).

5.3 Nominal Voltage selector switch Un

The nominal voltage (phase to neutral) has to be selected via this selector switch :

Switch settings :

Un 50/60Hz ± 1Hz		Switch Pos.
L - N	L - L	
Invalid		0
110V AC	190V AC	1
220V AC	380V AC	2
230V AC	400V AC	3
240V AC	415V AC	4
255V AC	440V AC	5
277V AC	480V AC	6
Parameter Set		7
Reserved		8~9

Note : The correct setting has to be done **before** the MPU is connected to the mains voltage (ref. to chapter 6)

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6 Getting started

Before the power supply of the MPU is switched on, several settings have to be done :

1. Select the correct nominal voltage level Un :

The Un-selector switch has to be in the correct position (acc. the list printed on the enclosure).



Figure 11. Un selection

2. Select the operating mode (ERM/TDRM) :

The Main Unit has to be removed from the Base Unit. On the PCB board the selector switch for the operating mode is located.

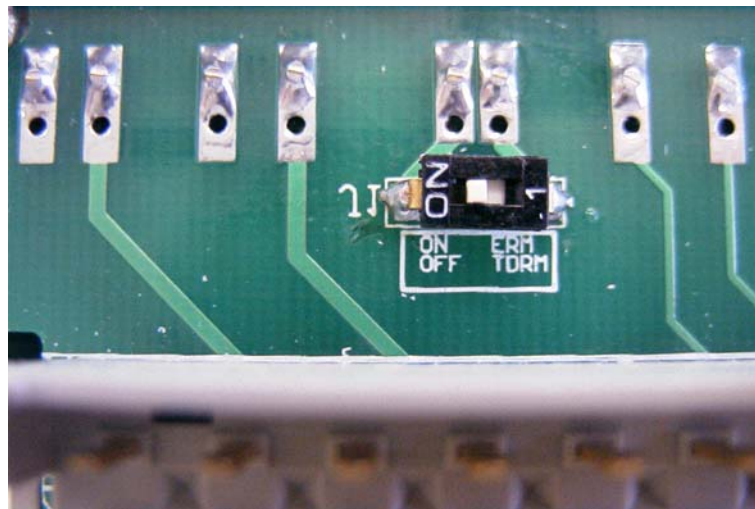


Figure 12. Operating mode selection

After power up the selected operating mode is indicated on the top of MPU with LEDs.

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3. Select the Restart Delay Time (Ts) :

The Ts-selector switch has to be in the correct position (acc. the list printed on the enclosure). In Pos. F the MPU is using the setting adjusted by the user with the Parametrization Tool software.



Figure 13. Ts selection

4. Now the MPU is ready for power up. After power up of the MPU the selected operating mode is indicated with a LED :

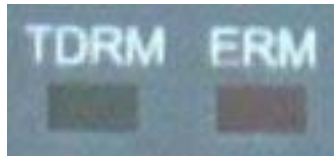


Figure 14. Indication of operating mode

These LEDs also indicate that the internal power supply is OK as at least one of the LEDs has to be ON.

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7 MPU Parametrization

7.1 General

MPU parametrization is done using the MPU Parametrization Tool which is a Windows based software. It is used to adjust additional MPU restart parameters like maximum auto-restart time and voltage detection levels, which can not be adjusted by selector switches.

Note: MPU is using the software settings as parameters, if the selector switch for Ts is in position "F".

7.2 Programming Interface

The MPU provides a serial link programming interface (RJ45 connector) for optional parametrization. The Parametrization Tool software is then used to change parameter settings.

The programming interface is located on the top of the Main Unit and is hidden behind the cover. The changed parameters of the MPU are stored in non-volatile Flash memory.

To connect the MPU to the PC a MPU Download Cable is available (for ordering information of the download cable see section 8.7).

Caution! The serial port must NOT be used if voltage measurement is connected and switched ON.

Notes:

7.3 Parametrization Software

7.3.1 Parameters and Settings

The following parameters can be influenced by software settings :

Description	Range	Step	Default setting	Remark
Undervoltage-Detection-Level (UDL)	0 – 99% x Un	1%	65%	General parameter
Voltage-Restoration-Level (VRL)	0 – 100% x Un	1%	90%	General parameter
Max. duration of voltage dip for delayed restart (Trestart)	0 – 120s	1s	4s	General parameter
Staggered Start Delay Time (Ts)	0 – 1200s	1s	5s	Only valid if selector switch Ts is in Pos. F

Note: 1. The UDL level has always to be lower than the VRL level.
2. After setting the new parameters with the software tool the MPU has to be restarted (power off/on).

7.3.2 Available functions

The Parametrization Tool software provides following functions :

- Edit parameters
- Save parameter file to disk
- Load parameter file from disk
- Send parameters to MPU (by use of the RS232 interface of the PC)
- Read parameters from MPU (by use of the RS232 interface of the PC)

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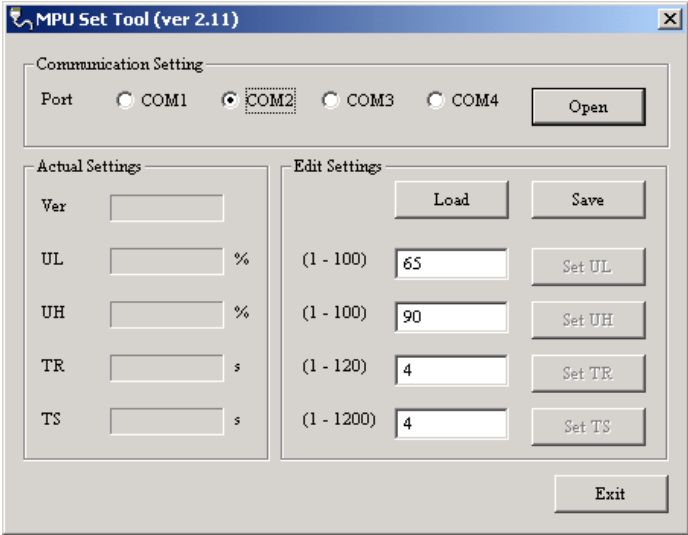
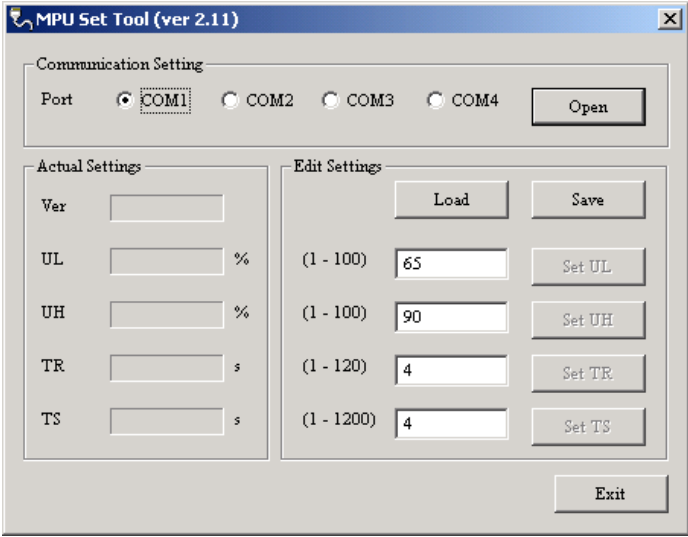
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7.3.3 Parametrization steps

7.3.3.1. General prerequisite

Serial MPU link cable is connected between MPU interface (RJ45 connector) and PC serial COM-Port.


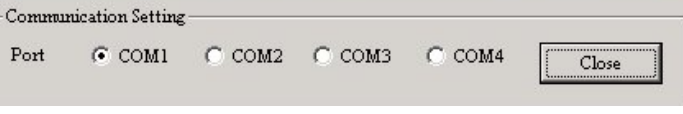
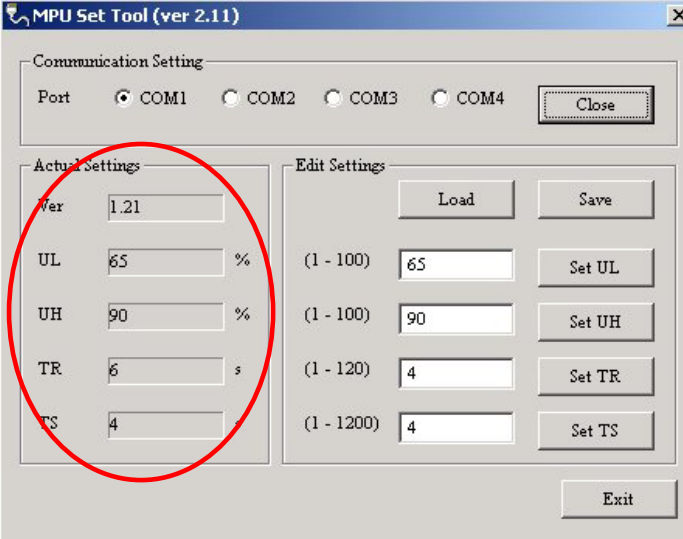
7.3.3.2. Software startup

Description	Setting
<p>Switch off MPU power supply</p>	
<p>Start up Parametrization Tool software :</p> <p>MPU Set Parameters.exe</p>	 <p>The screenshot shows the 'MPU Set Tool (ver 2.11)' window. Under 'Communication Setting', the 'Port' section has radio buttons for COM1, COM2 (selected), COM3, and COM4. Below this are 'Actual Settings' and 'Edit Settings' sections. 'Actual Settings' includes fields for Ver, UL (%), UH (%), TR (s), and TS (s). 'Edit Settings' includes 'Load' and 'Save' buttons, and specific value fields for UL (65), UH (90), TR (4), and TS (4), each with a 'Set' button. An 'Exit' button is at the bottom right.</p>
<p>Select COM-Port on PC side where the MPU-Download cable is connected.</p> <p>e.g.: COM1</p>	 <p>The screenshot shows the 'MPU Set Tool (ver 2.11)' window. Under 'Communication Setting', the 'Port' section has radio buttons for COM1 (selected), COM2, COM3, and COM4. The rest of the interface, including 'Actual Settings' and 'Edit Settings' sections, is identical to the previous screenshot.</p>

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Notes:

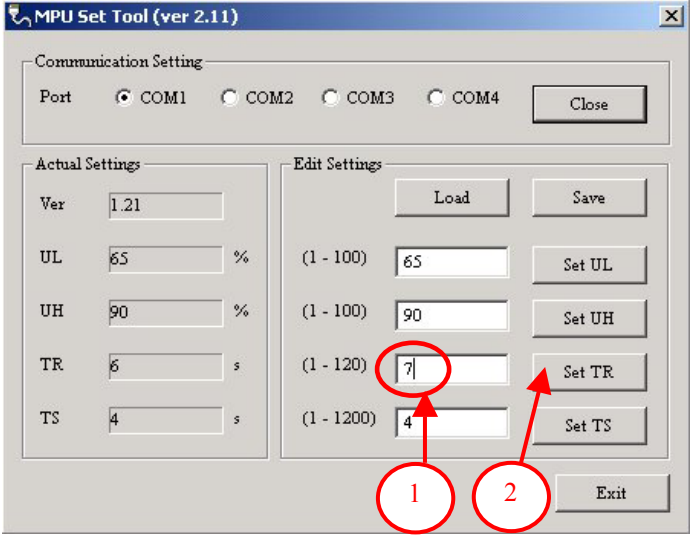
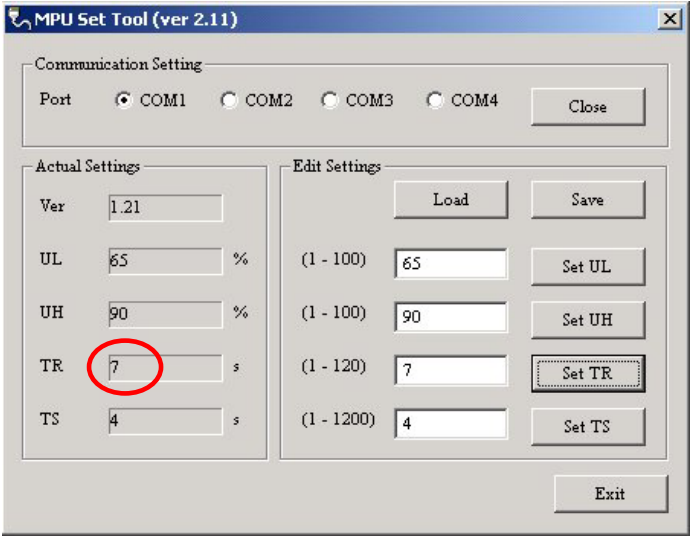
Description	Setting																						
Press OPEN -button to open the COM-Port	 <p>Communication Setting Port <input checked="" type="radio"/> COM1 <input type="radio"/> COM2 <input type="radio"/> COM3 <input type="radio"/> COM4 <input type="button" value="Open"/></p>																						
The „Open“ button changes to „Close“.	 <p>Communication Setting Port <input checked="" type="radio"/> COM1 <input type="radio"/> COM2 <input type="radio"/> COM3 <input type="radio"/> COM4 <input type="button" value="Close"/></p>																						
Switch MPU power supply (24V DC) ON .	Both LEDs ERM and TDRM must light up and keep shining. This indicates that the communication is established.																						
<p>The actual parameters and firmware version are uploaded from MPU and the values are displayed in the window „Settings“</p> <p>Parameter description:</p> <p>Ver: Firmware version</p> <p>UL: Undervoltage Detection Level (UDL)</p> <p>UH: Voltage Restoration Level (VRL)</p> <p>TR: max. power down time for automatic restart</p> <p>TS: Staggered start delay time</p>	 <p>MPU Set Tool (ver 2.11)</p> <p>Communication Setting Port <input checked="" type="radio"/> COM1 <input type="radio"/> COM2 <input type="radio"/> COM3 <input type="radio"/> COM4 <input type="button" value="Close"/></p> <p>Actual Settings</p> <table border="1"> <tr><td>Ver</td><td>1.21</td></tr> <tr><td>UL</td><td>65 %</td></tr> <tr><td>UH</td><td>90 %</td></tr> <tr><td>TR</td><td>6 s</td></tr> <tr><td>TS</td><td>4</td></tr> </table> <p>Edit Settings</p> <table border="1"> <tr><td>(1 - 100)</td><td>65</td><td>Set UL</td></tr> <tr><td>(1 - 100)</td><td>90</td><td>Set UH</td></tr> <tr><td>(1 - 120)</td><td>4</td><td>Set TR</td></tr> <tr><td>(1 - 1200)</td><td>4</td><td>Set TS</td></tr> </table> <p><input type="button" value="Load"/> <input type="button" value="Save"/> <input type="button" value="Exit"/></p>	Ver	1.21	UL	65 %	UH	90 %	TR	6 s	TS	4	(1 - 100)	65	Set UL	(1 - 100)	90	Set UH	(1 - 120)	4	Set TR	(1 - 1200)	4	Set TS
Ver	1.21																						
UL	65 %																						
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(1 - 100)	90	Set UH																					
(1 - 120)	4	Set TR																					
(1 - 1200)	4	Set TS																					

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Notes:

7.3.3.3. Change parameters

Description	Setting
<p>1. Change the parameter value</p> <p>2. Press the corresponding „Set XX“ button</p> <p>Note: If more than one parameter has been changed, each has to be sent to MPU separate using the individual SET button.</p>	
<p>Now the changed parameter is transferred and stored in the MPU.</p> <p>The changed parameter is automatically updated in the Setting window.</p>	
<p>After all changes have been done, switch power supply OFF and disconnect MPU Download cable.</p> <p>The changed parameters are valid after next MPU power on.</p>	

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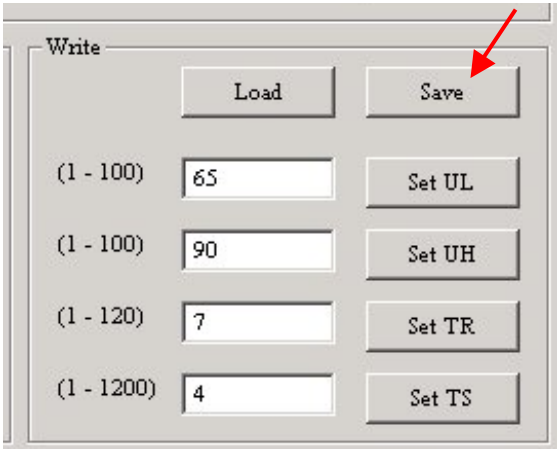
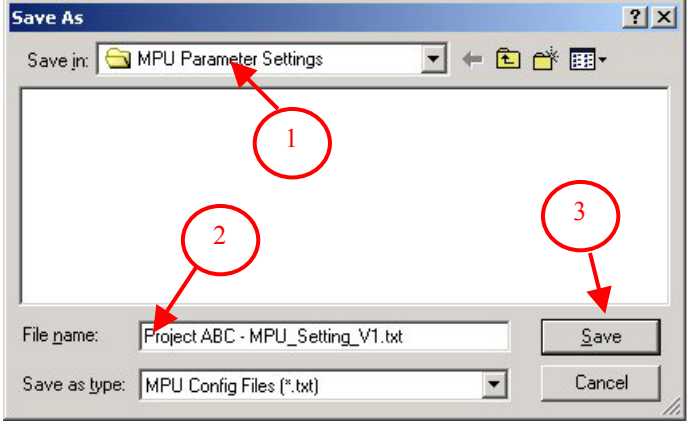
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Notes:

7.3.3.4. Save / Load parameters from disk

Parameter settings can be saved to and later again loaded from disk. This option can be used to archive the parameter settings for different motors or projects.

Save parameters to disk

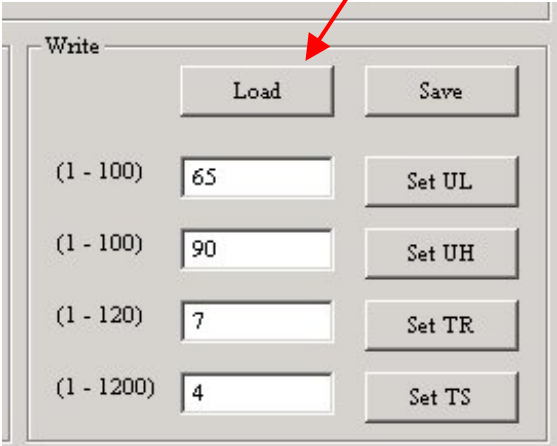
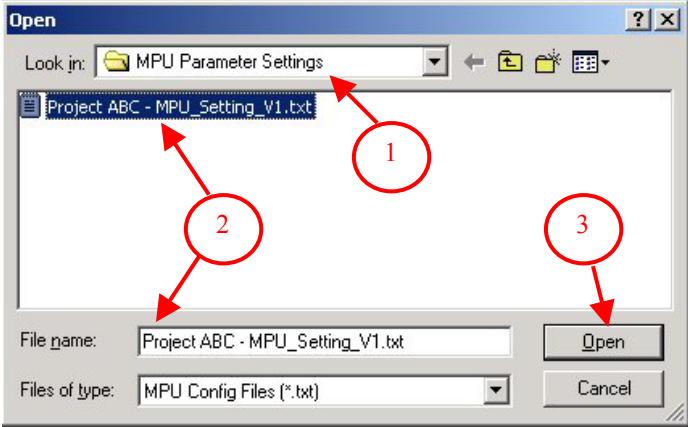
Description	Setting
<p>To save parameters to disk press button Save .</p> <p>Note: Only the parameters in the window „Write“ are saved to disk.</p>	
<p>Select the directory, enter the filename for this parameter setting and press Save button.</p>	

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Notes:

Load parameters from disk

Description	Setting
<p>To load parameters from disk press button Load .</p>	
<p>Select the directory and filename for the parameter set and press Open button.</p>	
<p>Now the parameters can be downloaded into the MPU device (ref. to 3.3.2)</p>	


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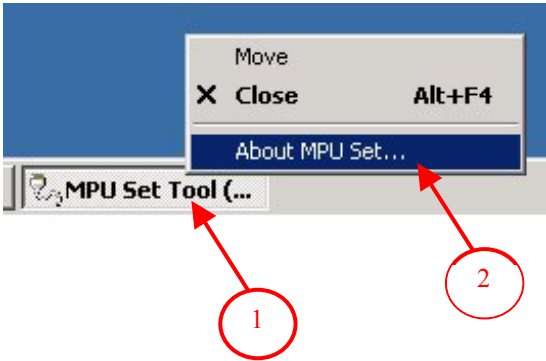
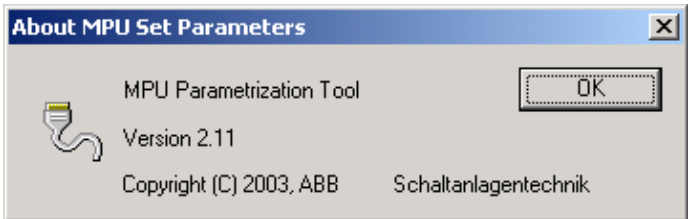
Notes:

7.3.4 MPU Parametrization Tool software version

The information about the software version of MPU Parametrization Tool is displayed in the header of the program window or can be seen in the Task-bar of Windows :

Description	Setting
	

OR :

Description	Setting
<ul style="list-style-type: none"> • Move mouse to <i>MPU Set Tool</i>- icon in the Task bar (1) • Press right mouse button (2) and select „About MPU Set...“ 	
<p>The information about the Parametrization Tool software is displayed.</p>	

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Notes:

8 MPU Installation

The following pictures show the different possibilities to install the MPU. The Baseplate is mechanically fixed to the drawer mounting DIN-rail or can be fixed with screws.

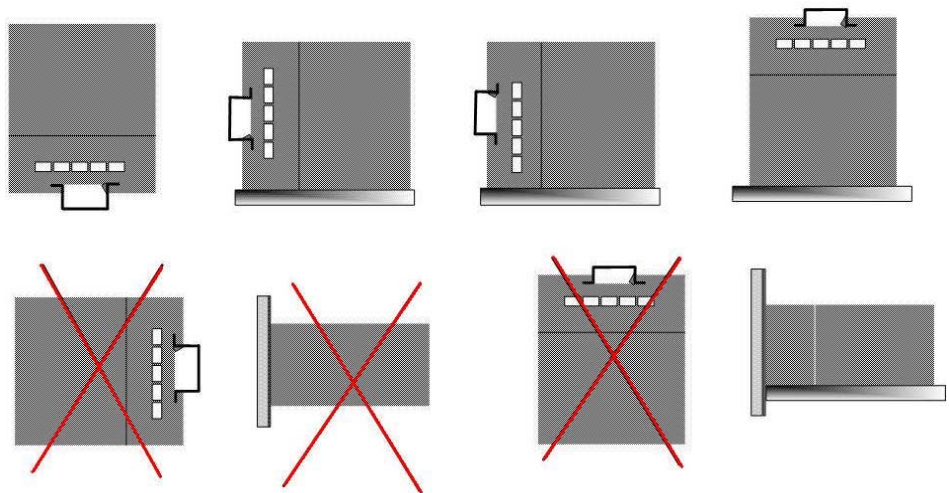


Figure 15. MPU installation possibilities

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Notes:

9 Appendix A: Technical Data

9.1 General electrical data of the MPU

Auxiliary supply voltage	
Rated operational voltage (U _e)	24VDC
Voltage operation range / current	+20 ... +36VDC
Current consumption MPU	80mA (typ.) / 24VDC
Power consumption MPU	2W (typ.)

Voltage measurement (nominal voltage U _n , AC:50/60 Hz +/-1Hz) Phase-N (= Phase-Phase)		Selector switch position
110V AC/DC	(=190V AC)	1
220V AC/DC	(=380V AC)	2
230V AC/DC	(=400V AC)	3
240V AC/DC	(=415V AC)	4
255V AC/DC	(=440V AC)	5
277V AC/DC	(=480V AC)	6
Rated impulse withstand voltage (U _{imp})	4kV (2,5kV)	
Power consumption voltage measurement	< 1VA	

Max. ratings for contactor control relay KR CW / KR CCW and Watchdog / GPO1 / GPO2 relays (change over contacts)	
Max. switching voltage	380V AC
Max. switching current	8A AC
Max. continuous current	2A (DC-13) or 2A (AC-15)
Max. switching capacity	2000 VA
Rated impulse withstand voltage (U _{imp})	4kV
Rated conditional short circuit current (I _q r.m.s)	78A

Input Feedback signals CW,CCW	
Number of inputs	2
Max. input voltage	300V
Rated impulse withstand voltage (U _{imp})	4kV (2,5kV)

Digital output "Undervoltage", "Staggered Start"	
Number of relay output	2 (change over contacts)
Rated operational current	0,5A
Rated operational voltage	24VDC / 230VAC

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Notes:

9.2 Restart function data

Detection level mains voltage interruption (UDL)	0..99% x Un via software setting default setting : 65% x Un Accuracy : $< \pm 0,03xUn$
Detection level mains voltage return (VRL)	0..100% x Un via software setting default setting : 90% x Un Accuracy : $< \pm 0,03xUn$
Permissible residual coil voltage at :	
• switched-off contactor K1 / K2, Auto-On1/2	$< 0,3 \times Un$
• switched-on contactor K1 / K2, Auto-On1/2	$> 0,6 \times Un$
Min. undervoltage detection time	8 ms
Fast restart delay time	$\leq 30ms$
Max. duration of voltage dip for delayed restart (Trestart)	Selectable via software : Range : 1s – 120s Steps : 1s Default : 4s Accuracy : $\pm 200ms$
Duration of restart puls (relay KR CW/CCW)	1s

Staggered start delay time (U > mains voltage return level, e.g. 90%) Accuracy : $\pm 0,1s$		
	Time	selector switch pos.
	1s	1
	2s	2
	5s	3
	10s	4
	15s	5
	20s	6
	25s	7
	30s	8
	35s	9
	40s	A
	45s	B
	50s	C
	55s	D
	60s	E
	Use software settings	F

9.3 Environmental conditions

Ambient temperature range	
Storage	-25...+85 °C
Normal operation	-5...+55 °C

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9.4 Construction

Dimensions	110 x 105 x 65 mm (W x H x D)
Weight complete	0,4kg
Baseplate only	110g
Main Unit only	290g
Protection class	IP20

9.5 Standards

IEC 60947-1	Low-Voltage switchgear and controlgear, Part 1 : General rules, Edition 2.2.1998-11
IEC 60947-4-1	Low-Voltage switchgear and controlgear, Part 4 : Contactors and motor starters, First edition : 1990-07 Section 1 – Electromechanical contactors and motor starters Amendment 1 : 1994-11 Amendment 2 : 1996-08
IEC 60947-5-1	Low-Voltage switchgear and controlgear, Part 5 : Control circuit devices and switching elements, First edition : 1990-03 Section One – Electromechanical control circuit devices Amendment 1 : 1994-05 Amendment 2 : 1996-06

9.6 EMC compatibility

Immunity tests :

Electrostatic discharge	IEC 61000-4-2 :	Level 3
Electromagnetic field	IEC 61000-4-3 :	Level 3
Fast transient bursts	IEC 61000-4-4 :	Level 4
Surges (1,2/50µs)	IEC 61000-4-5 :	Level 3
Conducted disturbances	IEC 61000-4-6 :	Level 3

Emmision tests :

Conducted radio-frequency emmision tests	EN 55022, Class B
Radiated radio-frequency emmision tests	EN 55022, Class B

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9.7 Environmental Tests

Cold	IEC 60068-2-1
Dry heat	IEC 60068-2-2
Change of heat	IEC 60068-2-14
Cyclic change of heat	IEC 60068-2-14
Humidity test	IEC 60068-2-30

Vibration	IEC 60068-2-6:	Class 1
Shock	IEC 60068-2-27:	Class 1

9.8 Ordering Information

Description	Ident number	Description
INSUM [®] MPU Kit	1TGL 920000 R2001	incl. Main Unit and Baseplate
INSUM [®] MPU Baseplate Kit	1TGL 920000 R3001	incl. MPU Cover and MPU Baseplate
MPU Main Unit	1TGL 920000 R0001	
MPU Download Cable	1TGL 920000 R5001	for Parametrization

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