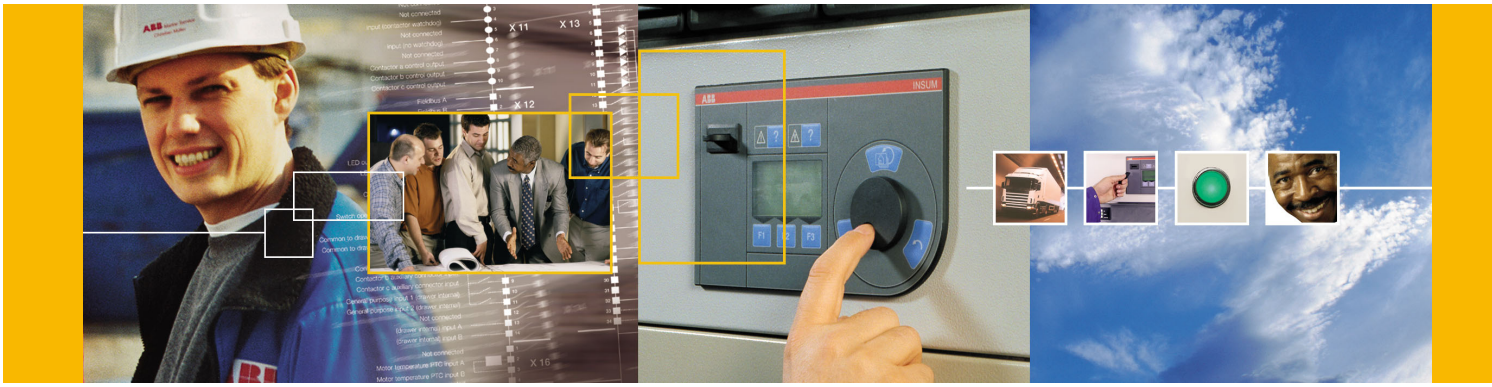
Protect^{IT} – MNS Motor Management INSUM®

MMI Operating Instructions
Version 2.3



INSUM®
MMI Operating Instructions

Version 2.3

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Reference document 1TGB 350008 R1.5

MMI Operating Instructions

Version 2.3

Notes:

1 General

1.1 Introduction

The purpose of the MMI (Man-Machine-Interface) is to display the measured values and status information of all devices connected via the LON network, to set the parameters for these devices and to control them.
The MMI is connected to the INSUM backplane via a standard cable. This cable is used for both power supply and data exchange. Data exchange uses the LON bus.
When the device has been connected, the data records of all connected devices are read. The data records and the measured values can then be visualized on the 6-line LCD display. The values of interest are selected with the help of the encoder wheel or the buttons available on the MMI front panel.
If the necessary access privileges have been granted, which are verified by an electronic key, devices can be operated, parameterized and installed.

1.2 Related Documentation

1TGC 901007 B0201 INSUM Technical Information
1TGC 901021 M0201 INSUM MCU Users Guide
1TGC 901026 M0201 INSUM MCU Parameter Description
1TGC 901030 M0201 INSUM MMI Quick Guide
1TGC 901042 M0201 INSUM Modbus Gateway Manual
1TGC 901052 M0201 INSUM Profibus Gateway Manual
1TGC 901060 M0201 INSUM Ethernet Gateway Manual
1TGC 901080 M0201 INSUM System Clock Manual
1TGC 901090 M0201 INSUM Control Access Guide
1TGC 901091 M0201 INSUM Failsafe Guide
1TGC 901092 M0201 INSUM Dual Redundancy Guide
1TGC 901093 M0201 INSUM Network Management Guide
SACE RH 0080 Rev.I PR112/ PD-L LON Works Interface V2.0
1SEP 407948 P0001 Users Manual Intelligent Tier Switch (ITS)

Notes:

2 MMI Control elements

2.1 Front panel

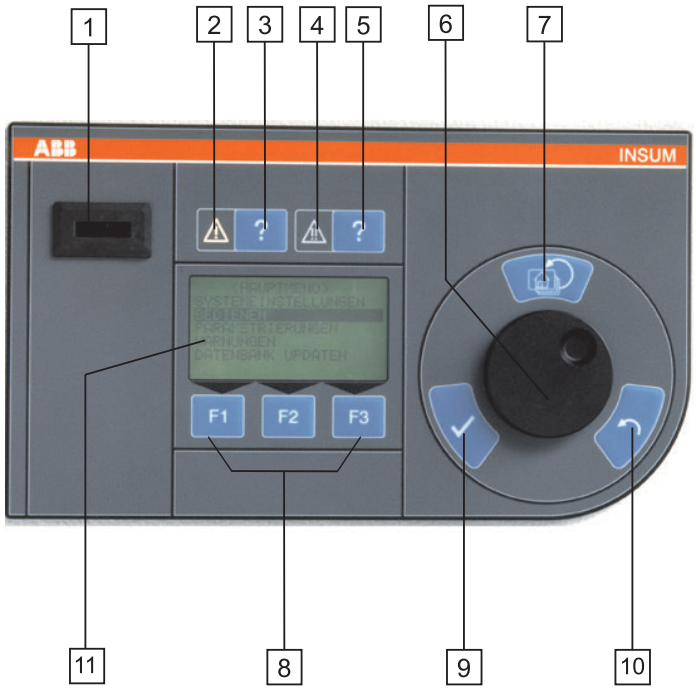


Figure 2-1 MMI front panel view

1	Slot for electronic data key	**7**	HOME key
2	ALARMS indicator	**8**	Function keys F1, F2, F3
3	ALARM LIST key	**9**	ENTER key
4	TRIP indicator	**10**	ESCAPE key
5	TRIPS LIST key	**11**	LCD display
6	ENCODER wheel		

The components shown in Figure 2-1 are described in the following list:

Data Key (1) — The key serves to review the user's access privileges electronically. The access privileges can be defined individually by the "INSUM Key Tool", and the keys are programmed accordingly.

-"!"- Indicator (2) — This indicator flashes or is illuminated in yellow color if at least one alarm is present.

"?" key (3) — Pressing this key will display a list of the field devices that have an alarm present

Notes:

-"!!"- Indicator (4) This indicator flashes or is illuminated in red color if at least one trip is present.

"?" key (5) Pressing this key will display a list of the field devices that have a trip present.

ENCODER wheel (6) With the help of the ENCODER wheel, the user can move through the different menus of the MMI. Turning the wheel counter-clockwise will move the cursor downward, turning it clockwise will move the cursor upward. The menu item currently selected by the ENCODER wheel has a dark background (inverse video).

HOME key (7) Pressing this button will let the MMI jump back to the <MAIN MENU> from any position within the program.

Function keys (8) The functions of keys F1, F2 and F3 are displayed in the last line of the LCD display. If no text is displayed above the key, the respective key has no function. The most important functions offered by the various menus are described in the following list:

Data searching functions (general):

↓	Move the cursor up or down
→	Move the cursor to the right
←	Move the cursor to the left

Operating commands for MCU:

START	Switch the motor on (has to be operated twice; 1- selection; 2- confirmation)
STOP	Switch the motor off (has to be operated twice; 1- selection; 2- confirmation)
CW	Switch the motor on - clockwise rotation
CCW	Switch the motor on - counter-clockwise rotation
START-N1	Switch the motor on - speed N1
START-N2	Switch the motor on - speed N2
CW-N1	Switch the motor on - clockwise rotation - speed N1
CW-N2	Switch the motor on - clockwise rotation - speed N2
CCW-N1	Switch the motor on - counter-clockwise rotation - speed N1
CCW-N2	Switch the motor on - counter-clockwise rotation - speed N2
OPEN	Open valves (or similar drives)
CLOSE	Close valves (or similar drives)
RESET	Reset of an alarm (has to be operated twice 1- selection; 2- confirmation)
LOCAL	Change over to MCU local operation
BUS	Change over to MCU operation via bus

Notes:

Operating commands for CB release PR112:

OPEN	Open CB contacts
CLOSE	Close CB contacts
RESET	Reset of an alarm

ITS:
No operating commands

System commands (for all devices if not otherwise mentioned):

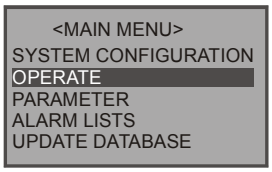
REMOVE	Removes the MCU from the motor list
EDIT	Changes to Edit mode, parameters can be input or modified
PARAM	Changes directly to the submenu from which the MCU parameters are set
PAR DEF	Resets field device parameters to standard values (not available for PR112 and ITS)
GETPAR	Load parameter set from device
CHK OFF	Disables parameter logic; all parameters are shown
CHK ON	Enables parameter logic; parameters are filtered, e.g. in dependence of the chosen type of drive (not available for PR112 and ITS).
SAVE	Save MMI parameters
SEND	Send changed or new parameters to the field device
OPERATE	Changes directly to the submenu from which the motor can be operated (switched on/off)
SEND	Sends the modified or new parameters to the MCU
ACK	Confirm new warnings and alarms
INSTALL	Installation/assignment of the LON address
DEFAULT	Setting of default bindings
WINK	When pressed, the "available" indicators on the field device flash
REQU-CA	Request for control access (not available for ITS)
PASS-CA	Transmit control access (not available for ITS)
GET-CA	Take over control access (w/o request) (not available for ITS)

ENTER key (9)

Pressing this key confirms the menu item selected with the ENCODER wheel. The MMI will then perform the desired function, e.g., selection of a menu item or motor.

ESCAPE key (10)

Operating this key will cancel an undesired activity, or the MMI will return to the previous menu (one step back).



Display (11)

The display consists of a six-line LCD on which the system data is visualized. The line or box with the dark background (cursor) is currently active and can be selected with the ENTER key. The functions currently assigned to the function keys are displayed in the last line.

Notes:

2.2 Control elements on the right side of the unit

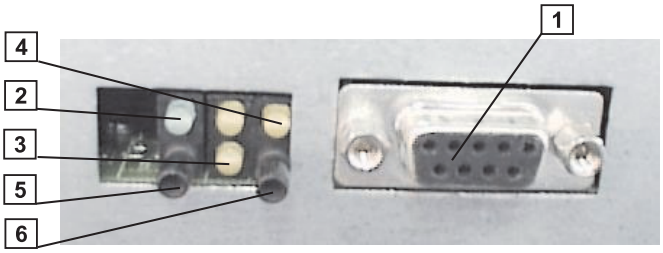


Figure 2-2 right side of unit

1 - 9 pin female connector	Download port for loading new software releases.
2 - LED (green)	Indicates CPU activity. LED flashes if MMI is healthy.
3 - LED (2 x yellow)	Indicates LON bus communication. The upper LED flashes if data is transmitted on the LON bus.
4 - LED (yellow)	Status display of the LON node. The LED is on when the initialization key (service PIN) is operated. If the LED flashes, the LON section of the unit has not been initialized. (node installation required!)
5 - Reset button	Button for restarting the MMI.
6 - Service button	Button for allocating the LON bus address (unit sends “Service PIN Message”)

2.3 Ports on the left side of the unit

The 9-pin connector for connecting the MMI to the termination plate of the INSUM backplane is located on the left side panel of the unit. The power supply and bus link from the MMI to the backplane are provided by the connection cable included in the delivery.

MMI hardware versions R1 and R2 are equipped with one connector on the left side of the housing (figure 2-3), in this case the bus termination resistor for the LON bus is integrated (for details regarding bus termination see figure 2-6).

Figure 2-3 Left side of housing (1TGB302004R1 and R2)

Notes:

Version R3 is equipped with 2 connectors (figure (2-4) thus it offers the possibility of connecting up to 3 MMIs in parallel to one particular backplane.

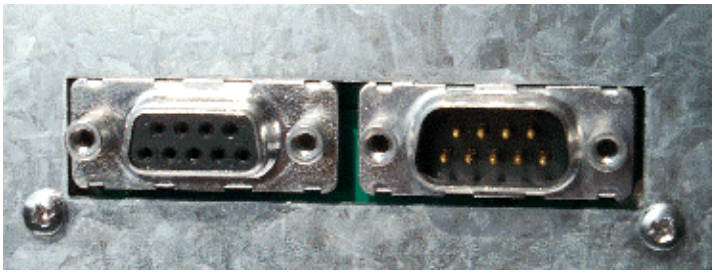


Figure 2-4 Left side of housing (1TGB302004R3)

If more than one MMI should be connected to one backplane (cascading), MMI connection cable of 2nd MMI is connected instead of the bus termination plug. On the last MMI of the cascade the bus connection plug has to be placed (see figures 2-5 and 2-7).

Remark: In case of a simultaneous start of all connected MMIs those start simultaneously to read parameters from field devices. Therefore an integrated algorithm prevents that different MMIs read data simultaneously from one and the same field device.

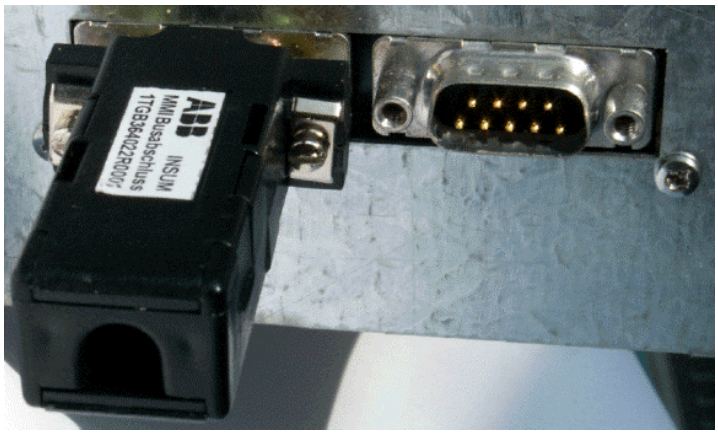


Figure 2-5 Left side of housing with bus termination

Notes:

Bus termination:

In order to avoid reflection and prevent the accompanying signal corruption, the LON bus must be terminated on both ends (and nowhere else).

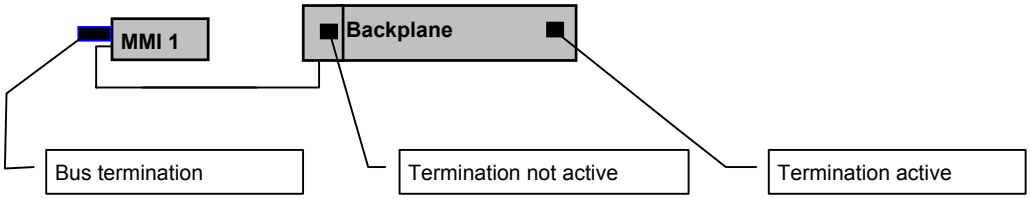


Figure 2-6: Bus termination and cable routing for one MMI

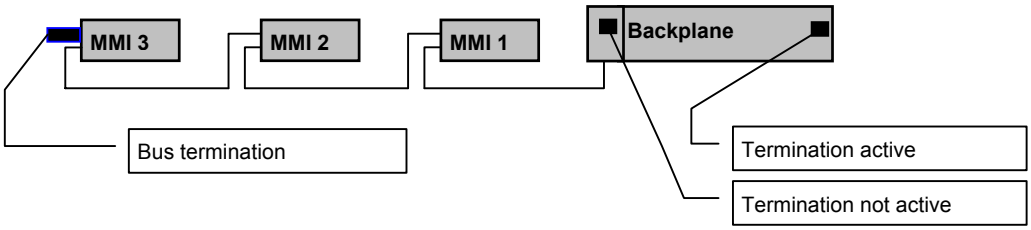


Figure 2-7: Bus termination and cable routing for use of several MMIs per backplane

2.4 Back side

The ground connector is located on the back side. By connecting a cable here, it is ensured that static charges and EMC noise are reliably discharged to the ground potential.

Figure 2-8 Back side

Notes:

3 Operation

3.1 Controlling the access privileges using the programmable key

Different access privileges can be allocated to different users or user groups by programming the electronic data key accordingly.

Figure 3-1 Programmable electronic data key

From MMI version 1.9 onward, privileges are assigned as follows:

When the SW version has originally been loaded into the MMI, all operating features incl. parameterization are enabled. If particular plants require more differentiated access levels for security reasons, specific user profiles can be defined and corresponding keys ordered.

The privileges may be assigned for each device type (MCU, ITS, PR112, MMI, Gateway, System Clock), for each protective function (and even each individual parameter), as well as for the operating activities, such as START, STOP, RESET, Installation.

Two types of keys are used in parallel:
- Configuration key
- User key

3.1.1 Configuration key

General
Used for defining the MMI access privileges without user key inserted and for allocation of the MMI to a particular predefined Process Group (incl. Plant number).

Details
When this key has been inserted into the MMI, a list of available Process Groups is displayed. By selecting one of these groups, the MMI will save this group together with the plant number and the chosen operating privileges "without user key inserted".

Examples (Predefined "default" configuration keys available as standard)

Key name	ConfigKey 1 Read only Key	ConfigKey 2 Read and Reset Key	ConfigKey 3 Param/Operate Key
Description of functionality w/o data key inserted	All values are available on MMI display w/o user key in MMI	All values are available, alarms and trips can be acknowledged and reset via MMI w/o user key in MMI	All values are available, parameterization / operation / acknowledge/ is allowed w/o userkey in MMI, except reloading of standard parameters
Member of Process Group	1 (of 16)	1 (of 16)	1 (of 16)

Options
Apart from above predefined configuration keys, user can order plant specific configuration keys, e.g. allocating particular plant locations to different "Process Groups" so that provided user keys (for details see 3.1.2) can only be used for a particular part of the plant.

Use / Installation
1. Plug in programmed configuration key into the data key slot on MMI front.
→ MMI shows a list of available Process Groups (1 through max. 16)

Notes:

2. Choose desired Process Group with the help of the encoder wheel.

Note:
- If predefined user keys (for details see 3.1.2) are used, it is a must to choose Process Group 1.
- In case plant specific user keys are used the valid Process Group (and Plant number, see chapter 3.4.2) can vary from substation to substation (range: 1...16) and has to be selected accordingly.

3. Choice has to be confirmed with the ENTER key.
→ MMI now stores the selected Process Group as well as the chosen MMI access profile for the case that no user key is inserted.
→ MMI display shows: *Saving MMI params*
Saving of Bindings/Params OK

4. Remove configuration key after successful storage.
→ From now on only user keys with programmed identical Process Group are accepted by this MMI.

3.1.2 User key

General
Used for allocation of particular user or user group privileges with reference to all backplane mounted devices, applicable for one single or more Process Groups.

Details
When this key is inserted into the MMI, plant number and Process Group will be scanned. If the plant number and process groups are identical with the values stored in the MMI, the operation privileges will be enabled according to the key user's profile. Keys that are invalid or not programmed are not accepted and will be rejected.

Examples (Predefined "default" user keys available as standard)

Key name	UserKey 1 Read/Reset/ ParamKey	UserKey 2 Read/Reset/ OperateKey	UserKey 3 AdminKey 1	UserKey 4 AdminKey 2
Description of functionality allocated	All parameters can be changed, acknowledge / reset of alarms and trips is allowed. No operation allowed.	Operating and acknowledge / reset of alarms and trips is allowed. No parameterization allowed.	Parameterization / operation / acknowledge / reset of alarms and trips is allowed.	Parameterization / operation / acknowledge / reset of alarms and trips is allowed except reloading of default parameters.
Member of Process Group (no.)	1 (out of 16)	1 (out of 16)	1 (out of 16)	1 (out of 16)

Options
Apart from above predefined user keys, user can order plant-specific user keys, e.g. allocating particular user keys to specific plant locations (via defining the "Process Group") or allocating specific functionality varying from the above profiles to particular user keys.

Use
User key has to be plugged into the data key slot on MMI front. The key is accepted when the programmed Process Group matches with the one allocated to this MMI (setting made by configuration key, for details see 3.1.1). When user key is allocated to a different Process Group, user key is rejected.

If user key is accepted, MMI grants access to the functions according to the programmed access profile of this particular user key.

Notes:

3.2 Menu structure

The INSUM system is operated via the MMI with the help of a menu/submenu system. The uppermost level is the <MAIN MENU> which offers six submenus. These submenus in turn contain more submenus.

This menu structure can be best compared to the branch structure of a tree. In order to get from the root to the branches, you have to press ENTER, and to go back you press ESCAPE. By pressing the HOME key, you return directly to the main menu.

The entire operation of the INSUM MMI has been structured according to the SELECTION - CONFIRMATION principle. An item is selected by turning the ENCODER wheel clockwise or counter-clockwise or by operating the function key with the appropriate function. The CONFIRMATION is given by pressing the ENTER key.

A desired menu option is selected by turning the ENCODER wheel until the dark background (active line shown in inverse video) is located on the desired menu item. This selection has to be confirmed by pressing the ENTER key. Then, the next submenu will be shown on the display. Again, the operator has to make a choice according to the principle described above.

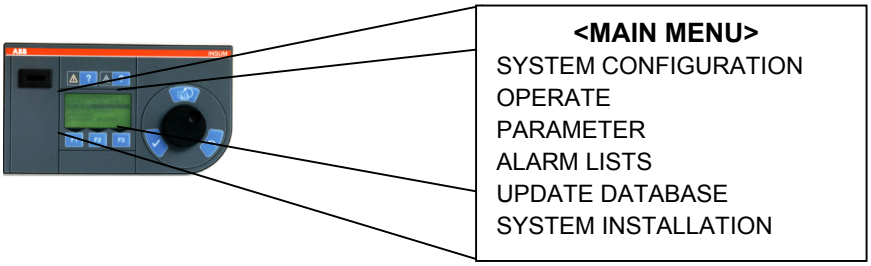
When a menu is not available in list form, the different menu items are displayed one by one in the cursor field marked by the dark background by turning the ENCODER wheel. If the parameter can be changed, the EDIT key will be offered.

If the operator now wants to jump back one menu level, he just has to press the ESCAPE key. It is also possible to go back directly to the MAIN MENU. Just press the HOME key in this case.

The F1, F2, and F3 function keys are menu sensitive. Their current function is displayed in the 6th LCD line above the respective function key. Operating the key will perform this function. If the function text flashes on the display when the key has been depressed once, the key has to be pressed again. This corresponds to the INSUM philosophy: 1. Selection; 2. Confirmation.

When all tasks in a menu are completed, you may press the HOME key or the ESCAPE key. Furthermore, the instructions shown in the display have to be performed. By pressing the ESCAPE key you may cancel undesired activities.

3.3 MAIN MENU



The submenus contained in the <MAIN MENU> are described below together with their respective functions.

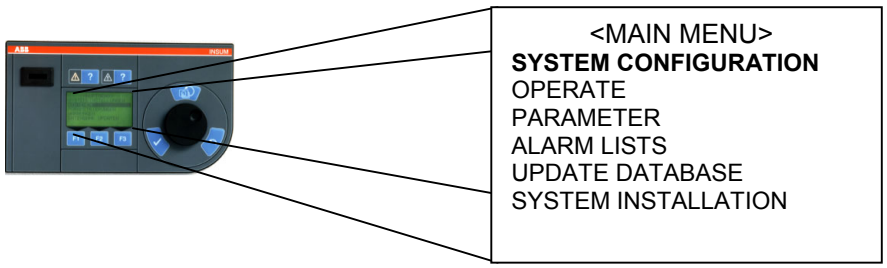
<MAIN MENU>	
SYSTEM CONFIGURATION	This menu contains all functions required for configuring the MMI, Gateways, System Clock and OS (except the Routers). Please note that the submenus of this function depend on the device to be configured.
OPERATE	This menu contains all functions required for operating the field devices (e.g. switch on/off, status display, measured value display).
PARAMETER	This submenu is used to set the parameters of the individual field devices.
ALARM LISTS	This function lists all motors with an active alarm or trip.
UPDATE DATABASE	Refreshes the MMI data base with the current device parameters.
SYSTEM INSTALLATION	Serves for allocation of LON bus addresses to the devices.

Notes:

3.4 SYSTEM CONFIGURATION

All parameters described in this section have been set to default values in new devices. These values only have to be changed when necessary.

1. Select the main menu by pressing the HOME key.



2. Select <SYSTEM CONFIGURATION> in the main menu by turning the ENCODER wheel, and confirm by hitting ENTER.

This menu lists all devices connected to the backplane, which can be parameterized through the MMI, by their INSUM LON bus addresses (e.g. MMI: 5/20, Gateway: 5/10).

3. Select MMI by turning the ENCODER wheel and confirm by hitting the ENTER key. If several MMIs are connected, the unit which is currently operated is marked with ">>".

<PARAMETER MMI>
SYSTEM
DEVICE DATA
USER INTERFACE

4. Selecting one of the submenus listed above with the ENCODER wheel and confirming it with the ENTER key will take you to the next submenu.

This menu contains a field with a dark background in which the current parameter is displayed.

5. Turn the ENCODER wheel to change over between the different parameters.

6. When the parameter has been selected, it may be changed by pressing the F1 - EDIT - function key.

Notes:

7. Choose the new value of the parameter by turning the ENCODER wheel. For entering plain text see note at the end of this page.

8. If the desired value is contained in the field shown in inverse video, it must be confirmed by hitting the ENTER key.

9. When all parameters have been changed and confirmed, they must be saved in the MMI. This can be done by pressing the F2 - SAVE - function key.

The MMI display now shows: "*SAVING MMI PARAMS*"
"*SAVING OF BINDINGS/PARAM OK*"

The parameter changes are now stored in the flash ROM of the MMI.

10. If you press the ESCAPE key, the current submenu is not exited (in this case <PARAMETERING MMI>) and more parameters can be changed as described above.
Press the HOME key to return directly to the <MAIN MENU> if you do not wish to make more changes.

Notes:

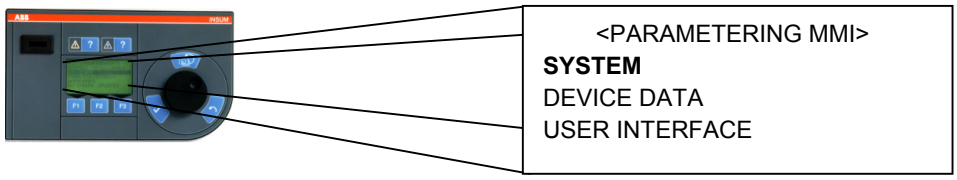
During the whole process of setting parameters, undesired choices can be aborted by pressing the ESCAPE key.

If it is necessary to enter plain text, e.g., the name of an MCU, the different letters are also selected by turning the ENCODER wheel. In this case, the letters are displayed in the cursor field in alphabetic order, with numbers and special characters appearing at the end of the list. When a character has been set properly, you may select the next letter field with the F1 (←) and F2 (→) function keys.
Please note that a text input has to be confirmed by hitting the ENTER key only once, i.e., when text input has been completed. It is not necessary to confirm each letter input.

Below, please find a description of the parameters that can be changed in the submenus.

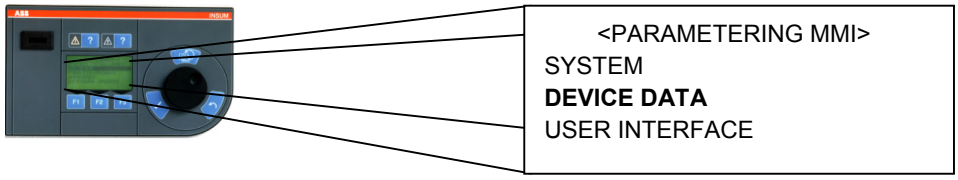
Notes:

3.4.1 SYSTEM CONFIGURATION – SYSTEM



<SYSTEM>	
FIELD DEVICE TIMEOUT	The field devices transmit data cyclically to the MMI. If no message is received from the field device within the timeout, a signal is emitted that the device has been removed.
SU LIFESIGN HEARTB.	This parameter defines the time interval in which the MMI transmits its life sign (SU Lifesign) to the LON bus.
SU LIFESIGN TIMEOUT	This parameter defines the monitoring time of the life sign of the connected backplane mounted devices (MMI, Gateways, OS). The monitoring results are entered in a lifelist.
SU LIFELIST HEARTB.	This parameter defines the transmit cycle time in which the lifelist of the backplane mounted devices is transmitted to the MCUs.
CA PRIORITY	This parameter specifies the priority of the MMI when allocating the control access (CA). The device with priority 1 has the highest priority. Each priority may be allocated a single time within the system. Devices with a higher priority may withdraw control access from devices with a lower priority.
CA OWNER NAME	This text contains the name of the MMI that is displayed when using the CA. These names are displayed in the MMI and inform the user on the Gateway, MMI, OS in possession of control access for an MCU or PR112.

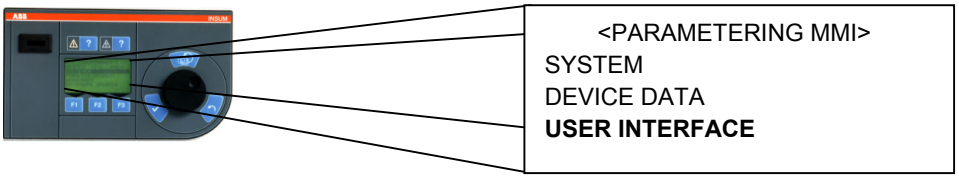
3.4.2 SYSTEM CONFIGURATION – DEVICE DATA



<DEVICE DATA>	
MMI FIRMWARE VERSION	Displays the software release version.
MMI HARDWARE VERSION	Displays the hardware release version.
FILE VERSION	Displays the version of the parameter file.
PLANT ID	The plant ID incorporated into the MMI is displayed. The parameters for the plant ID are set with the help of the configuration key (see section 3.1). User key contains a similar number. User key will not be accepted unless the two numbers are identical.
PROCESS GROUP NAME	Indicates the name of the process group, allocated via the configuration key (see section 3.1).

Notes:

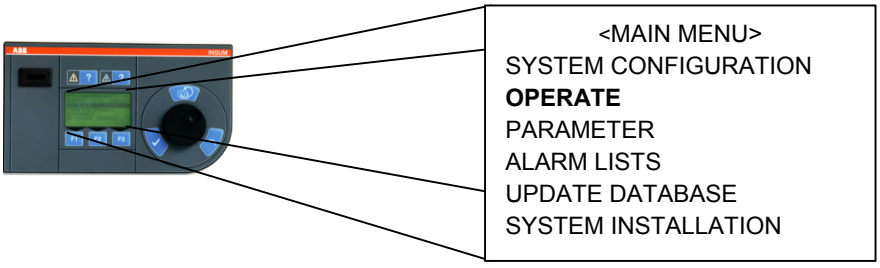
3.4.3 SYSTEM CONFIGURATION – USER INTERFACE



<USER INTERFACE>	
LANGUAGE	This parameter is used to define the language of the MMI display. You may choose between two different languages.
LCD CONTRAST	This parameter controls the contrast setting of the MMI display. It can be set in a range between 0% and 100%, with 100% representing the darkest setting.
LCD LIGHT	This parameter is used to control the deactivation of the LCD display. The user can select the time for turning off the display if no operation is carried out. (Pushing any key will reactivate the display.)
LCD WRITE DELAY	This parameter influences the control response of the LCD display. Normally, this value should be set to zero.
DISPLAY MODE	This parameter is used to define the way in which the motor is represented in the MMI. INSUM offers three options for the display: *Device ID1/ID2:* The field devices are displayed by their normal names in plain text (acc. to parameters "Motor identification" or "Device ID1/2") *LON Address:* The field devices are displayed by their LON bus addresses (SUBNET / NODE) *Location:* The display shows the location of the field device wiithin the switchgear panel (acc. to parameters "Starter identifier" or "Location identifier").

3.5 OPERATE

1. Select the MAIN MENU by pressing the HOME key.



2. Select <OPERATE> in the main menu by turning the ENCODER wheel, and confirm by hitting the ENTER key.

Notes:

The individual field devices are now listed in alphabetic order according the setting of MMI parameter DISPLAY MODE. The function keys have now the following meaning:

F1 F2 F3

PARAM	BUS/LOCAL	REMOVE
Jump to <PARAMETER> menu where the individual field devices are parameterized (see section 3.6).	Select between operating the field device locally or via bus.	Remove the field device from the device list

3. Select field device (mentioned example: MCU) by turning the ENCODER wheel and confirm by hitting the ENTER key.

The current device data is displayed in the following way:

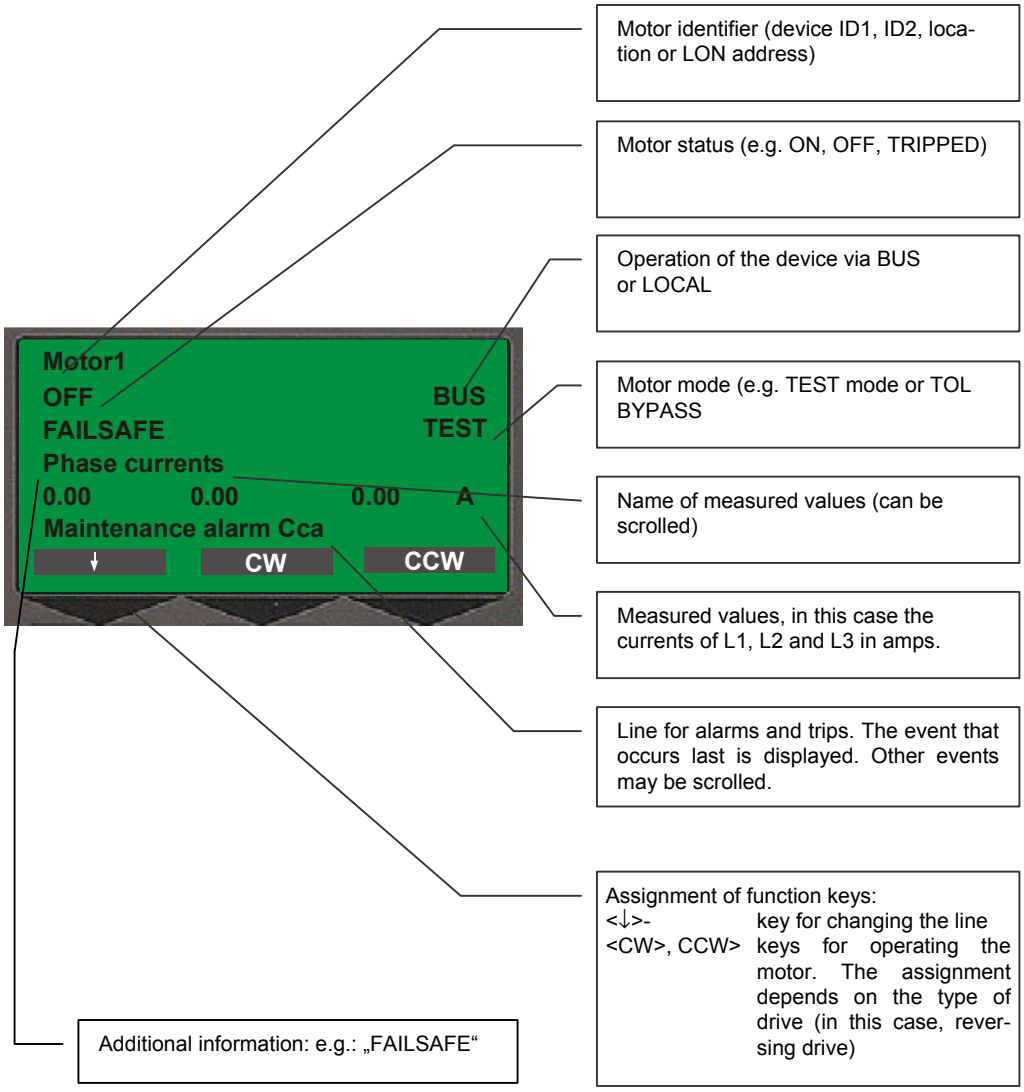


Figure 3-2: Example - MCU operation dialog

Notes:

F1

By pressing the F1 function key (↓), the cursor changes over between the first line (Motor identifier) and the fourth line (name of measured values).

Here, all measured values of the MCU can be displayed on the MMI, depending on the cursor position. If the cursor has been positioned on the fourth line, the various measurements can be called up by turning the ENCODER wheel. The fifth line delivers the related measured values.
In order to display the data of another motor or to operate other motors, the cursor must be positioned in the first line. Then, all motors connected can be selected by turning the ENCODER wheel.

F2 F3

4. The operating function is then displayed above function keys F2 and F3, depending on the parameterized type of drive.

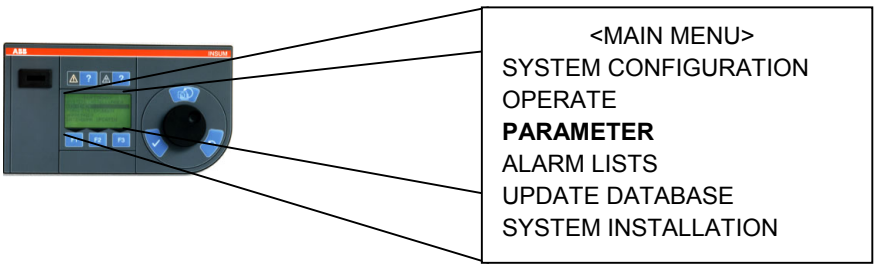
Press the function key twice in order to execute a desired operating function.
This is necessary in order to prevent uncontrolled activation of the motor and corresponds to the INSUM philosophy: 1.Selection 2.Confirmation.

It must be noted that the motor can only be operated (START/STOP) when the MCU is run in BUS mode.

3.6 PARAMETER

The parameters <u>cannot</u> be set while the motor is running.

1. Select the main menu by pressing the HOME key.



2. Select <PARAMETER> from the main menu by turning the ENCODER wheel, and confirm by hitting ENTER. Now, the function keys have the following meaning:

F1 F2 F3

OPERATE	PAR DEF	REMOVE
Jump to the OPERATE submenu from where the field device can be operated (see section 3.5).	Reset the device parameters to default values	Remove the device from the device list

Notes:

The individual devices are listed in alphabetical order. Using the MMI parameter DISPLAY MODE, you may select the device features (LOCATION, DEVICE ID1, DEVICE ID2 or LON ADDRESS) to be contained in the list.

3. The device to be parameterized must be selected from the list by turning the ENCODER wheel and confirmed by hitting the ENTER key. Then, the <PARAMETERING> submenu is displayed, which contains the various parameter groups, such as, e.g. the protective functions (see example hereunder).
After selection of one of these groups, the following function keys will be available.

F1 F2 F3

EDIT	OPERATE	CHK OFF
Edit the selected parameter.	Jump to the OPERATE submenu from where the device can be operated (see section 3.5)	Deactivates parameter checking, all parameters will be displayed.

The parameters are set with the help of the ENCODER wheel, the function keys, the ESCAPE and the ENTER key as already described earlier.

F2

When all parameters of one device have been entered, parameter setting is complete. Now, the new data has to be transmitted to the device. For this purpose, press function key F2 - SEND. The user is informed of this transmission by a display:

"SENDING PARAMETER FILE"
"PARAMETER FILE SENT"

Now, the modified parameters have been saved in the non-volatile memory of the field device. Please note: Parameters of one device have to be confirmed before starting parameterization of another device.

Parameter Menu

This menu shows the parameters that can be changed via the MMI for the individual device types. The structure of the menu depends on the individual device type. For the individual parameter setting options, please also refer to the parameter description of the respective device.

The following menus will be displayed for the individual field device types:

MCU 2

<PARAMETERING>
STARTER CONFIGURATION
MOTOR DATA
TOL PROTECTION
STALL PROTECTION
ROTATION MONITOR
PHASE LOSS PROTECTION
UNBALANCE PROTECTION
UNDERLOAD PROTECTION
COSPHI U/L PROTECTION
NO LOAD PROTECTION
EARTHFAULT PROTECTION
…

…
THERMISTOR PROTECTION
UNDERVOLTS PROTECTION
START LIMITATION
START INTERLOCK
MAINTENANCE
MOTOR GROUPING
CONTROL ACCESS
SYSTEM
DEVICE DATA
I/O CONFIGURATION
GEN.PURPOSE I/O
ANALOG OUTPUT

Notes:

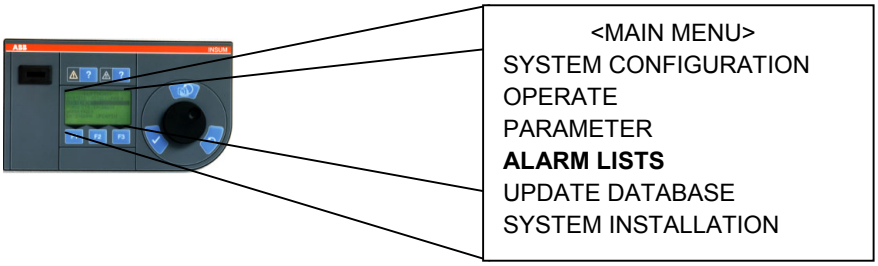
Circuit breaker release PR112:

<PARAMETERING>
DEVICE DATA
CB CONFIGURATION
PROTECTION L
PROTECTION S
PROTECTION I
PROTECTION G
PROTECTION T
LOAD CONTROLLER 1
LOAD CONTROLLER 2
SYSTEM
CONTROL ACCESS
SERVICE DATA

ITS (Intelligent Fuse Switch):

<PARAMETERING>
DEVICE DATA
LOCATION
SYSTEM

3.7 ALARM LISTS



When the MCU sends an alarm, the -(!)- LED flashes yellow. When a trip is present, the -(!!)- LED flashes red. New messages are entered at the top of the list and marked by (!). The messages can be acknowledged with the <ACKN/RESET> key, the (!) will then disappear. When all new messages have been acknowledged, the flashing light becomes a permanent light. When the cause of the trips or alarms has been removed, the entries will be automatically deleted from the list, and the alarm or trip light will go off (if not otherwise parameterized for the respective protection function with MCU parameter RESET MODE).

The alarms, warnings, fault messages and trips may be queried in two different ways on the MMI. The keys described above may be used, or the respective main menu function.

Alternative 1

1.1. Select the main menu by pressing the HOME key.

Notes:

1.2. Select <ALARM LISTS> from the main menu by turning the ENCODER wheel, and confirm by hitting ENTER.

More submenus are displayed:

<ALARM LISTS>
ALARMS
TRIPS

1.3 Selecting one of the submenus listed above with the ENCODER wheel and confirming it with the ENTER key will display another menu containing a list of all motors for which an alarm or trip is active, depending on the selection (alarm list or trip list):

1.4 If an alarm or trip has been detected on one motor only, the ENTER key must be pressed in order to visualize the mask, otherwise, the motor again has to be selected from the list and confirmed.

The alarm or trip is displayed in plain text, depending on the selection made.

OPERATE	ACKN/RESET
By pressing this key, the system directly jumps to the OPERATE submenu from where the motor can be operated (see section 3.5)	Reset alarm/trip

Alternative 2

The second possibility is to use the keys ? -(!)- (for alarms) and ? -(!!)- on the MMI front panel.

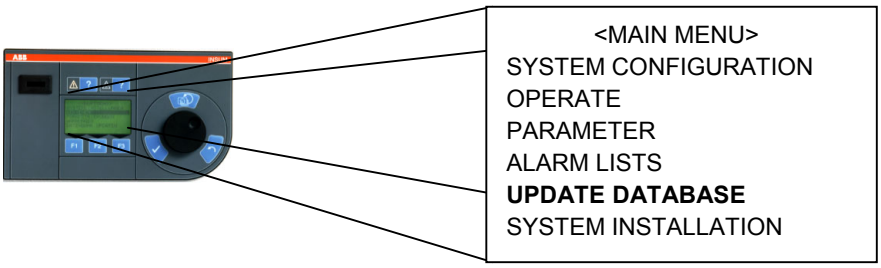
By pressing these keys, the user may display the messages directly and without calling up the “ALARM LISTS ” menu. When the appropriate key has been depressed, the list of the motors is immediately displayed again together with the type of message selected.

Confirming new messages

By selecting the desired motor, the cause of the alarm/trip is displayed in the text menu. By operating the relevant <ACKN/RESET> key again, the related display can be switched from a flashing to a permanently lit indicator showing that this alarm/trip has already been recognized.

Notes:

3.8 UPDATE DATABASE



This menu item allows the user to explicitly load the parameter file of the selected field device (from MMI SW version 1.9 onward parameters are scanned automatically and read in by the MMI).

1. Select the main menu by pressing the HOME key.

2. Select <UPDATE DATABASE> in the main menu by turning the ENCODER wheel, and confirm by hitting ENTER.

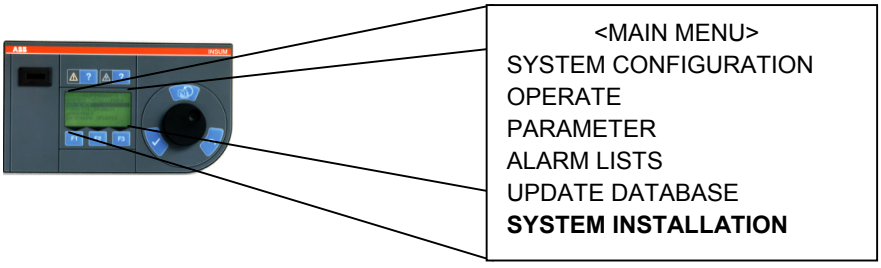
Press function key F1 - <GETPAR>.

The MMI display now shows: "*GETTING PARAMETER FILE*"
"*PARAMETER FILE RECEIVED*"

The device parameters have now been accepted to the MMI data base.

3.9 SYSTEM INSTALLATION – allocation of LON bus addresses, setting bindings

1. Select the main menu by pressing the HOME key.



Notes:

2. Select <SYSTEM INSTALLATION> in the main menu by turning the ENCODER wheel and confirm by hitting the ENTER key.

3. Select free address with the ENCODER wheel.

The following addresses are available:

1/1	to	4/32	for MCU 1 / 2 and/or ITS
4/1	to	4/32	for PR 112 (exclusively with special Router)
5/5			for System Clock (fix address)
5/10	to	5/13	for MODBUS-GATEWAY
5/16			for PROFIBUS-GATEWAY LINE 1 / 2
5/17			for PROFIBUS-GATEWAY LINE 3 / 4
5/20	to	5/29	for MMI
5/30	to	5/34	for OPERATOR STATION (OS)
5/35	to	5/39	for TCP/IP-GATEWAY
99/90	to	99/98	for spare devices

4. Confirm the desired address by hitting function key F1 INSTALL.

The MMI display now shows "*Press service pin to install node*"

I.e. for backbone devices such as the Gateway, MMI and OS, the corresponding "Service" key must be pressed, for withdrawable modules the switch handle is to be turned to Test position.

The MMI display now shows "*Installing node successful*"

5. Finally, the standard bindings have to be activated in the devices in order to complete address allocation.This is done using function key F2 - DEFAULT.

The MMI display now shows: *"Loading of default bindings successful"*

Address allocation has thus been completed. The addressed field devices are now available to the INSUM system.

6. Use the WINK key (F3) to display the selected and allocated address with the flashing LED (READY) on the withdrawable module. This is also another way of verifying whether the node has been successfully installed, or of locating the device within the switchgear system.

Notes:

4 Operation examples

4.1 Installing a new MMI

Task: A new MMI shall be installed in the LON network.

Procedure:

1. Connect MMI with the MMI connection cable to the backplane.
2. Set/examine the bus terminations (see section 2.3).
3. Select MMI menu “SYSTEM INSTALLATION”.
4. Select free bus address with the encoder wheel, e.g. 5/20.
5. Press the <INSTALL> key.
6. Press service button on the MMI (refer to Figure 2-2).
   - The address is allocated. MMI is restarted.
7. Select MMI menu “SYSTEM INSTALLATION”.
8. Select same address as before (e.g. 5/20).
9. Press the <DEFAULT> key.
   - The default LON bindings are loaded. The MMI is restarted.

Notes:

4.2 MMI settings

Task: An MMI, a Gateway and one Router are connected to the INSUM backplane. Furthermore, several MCUs are connected to the system.

a) The language of the MMI display is to be changed from English to German.
b) The name of the MMI is to be changed from MMI to HMI.

Procedure:

1. Press the HOME key in order to call up the MAIN MENU.
2. Turn the ENCODER wheel counter-clockwise, until the cursor is positioned on menu item SYSTEM CONFIGURATION and press the ENTER key in order to confirm your selection.
   - A new menu is opened which shows the LON addresses of the relevant INSUM devices.
3. Turn the ENCODER wheel until the cursor is positioned on the MMI address, e.g. 5/20, and press the ENTER key in order to confirm your selection.
   - A new menu containing the different possibilities of setting MMI parameters is displayed.
4. Turn the ENCODER wheel until the cursor is positioned on the USER INTERFACE option and press the ENTER key to confirm your selection.
   - A new menu is displayed which contains the parameter to be changed as well as its current value.
5. Turn the ENCODER wheel until the LANGUAGE parameter is displayed in the field shown inverse.
6. Press function key F1 - EDIT -, in order to enable changes to the parameter.
   - The inverse text field now shows the word ENGLISH, and the current value is displayed above.
7. Turn the ENCODER wheel until the display in the cursor field has been changed from “ENGLISH” to “2 nd language”.
   - The field shown in inverse video now displays “DEUTSCH” or another language, the current value is still ENGLISH
8. Press the ENTER key in order to confirm this selection.
   - The language on the display was changed from English to the 2nd language..
9. Press the function key F2 - SAVE - in order to save the new parameter value in the MMI.

   If you press the ESCAPE key, the current submenu is not exited (in this case <PARAMETERING MMI>) and more parameters can be changed as described above. Press the HOME key to return directly to the <MAIN MENU> if you do not wish to make more changes.

Notes:

4.3 Displaying measured values of the MCU

Task: It is desired to check the phase currents as percentage values and the active power of the motor (available only using MCU2) with the LON address 2/15 during operation.

Procedure:

1. Press the HOME key in order to call up the MAIN MENU.
2. Turn the ENCODER wheel until the cursor is positioned on the OPERATE option and press the ENTER key to confirm your selection.
   - A new menu is shown which contains a list of the MCUs connected.
3. Turn the ENCODER wheel to search LON address 2/15 and press the ENTER key in order to confirm your selection.
   - A new menu will be displayed which contains the MCU data.

Line 1: Motor identifier	(NET/NODE 2/15)
Line 2: Motor status	(ON) Operation via ... (e.g. BUS)
Line 3: Empty line	
Line 4: Name of measured values	(Phase currents)
Line 5: Measured values	(e.g. 11.25 11.22 11.23 A)
Line 6: Assignment of function keys	(F1 - ↓ - and F3 - STOP -)

4. Press function key F1 -↓ -
   - The cursor jumps to line 4.
5. Turn the ENCODER wheel clockwise.
   - The measured values in line 5 change from amps to percent (e.g. 98 96 97 %)
6. Turn the ENCODER wheel until ACTIVE POWER appears in the cursor field in line 4 (only with MCU2).
   - The active power is displayed in the fifth line (e.g. 3.0 kW).
7. Press the HOME key in order to return to the main menu.

Notes:

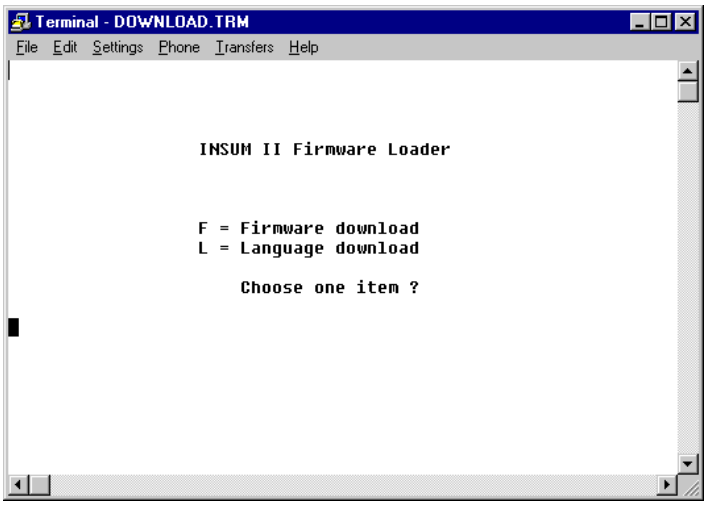
4.4 Loading a different MMI software (firmware) version

Task: MMI shall be loaded with firmware 1.8a and the belonging text files.

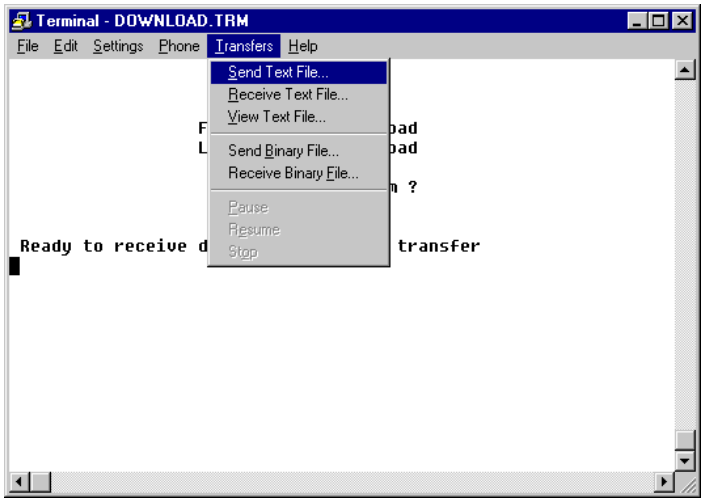
Procedure:

1. Connect one end of the download cable to the MMI and the other to the PC's serial port. Start download routine on the PC. The mmi.trm file contains the default settings of the serial port (19200 baud, COM 1/2, XON/XOff protocol: No. Parity: No; data bits: 8)

2. Press Reset button on the MMI (refer to Figure 2-2).

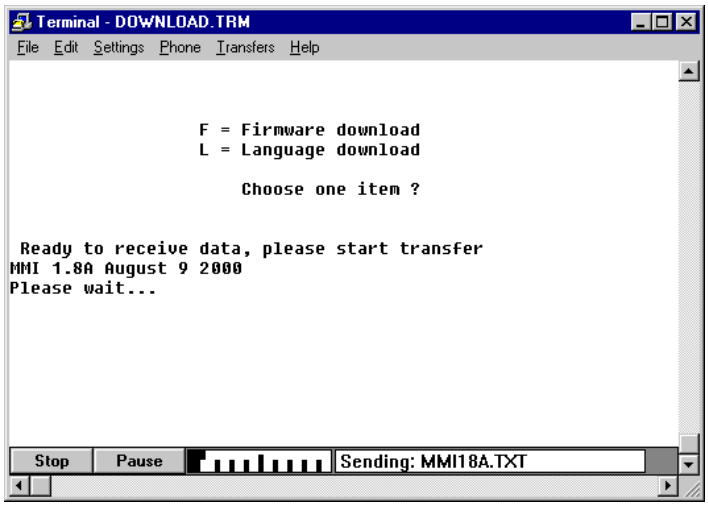


3. Press 'F' key on the PC and select "Transfers" - "Send Text File..."



Notes:

4. Select the correct path on your local PC or network, select and confirm file “Mmi18a.txt” (for version 1.8a as specified in the task).



- The new software version is loaded.
- When the text “Hit any key to return to the menu” is displayed, this part of the loading process has been completed.

5. Then, the two language files “MmEn18a.txt” and “MmGe18a.txt” have to be loaded using the ‘L’ key as described above.

6. Remove the download cable. Restart the MMI by pressing the Reset button on the MMI.

Notes:

4.5 Installing an MMI Configuration Key

Task: An MMI Configuration Key shall be installed.

Case A:
A predefined (standard) configuration key is in use.
Process group 1 (standard) shall be chosen.

Case B:
A customer specific configuration key is in use.
Different independent plant sections belong to one plant, whereby operators of sections (process groups) 1 and 2 shall not have access to section 3.
Process group 3 shall be chosen for this particular MMI.

Procedure:

1. Insert the configuration key for this plant section into the data key slot at the MMI.
   - On the display appears a list of all available process groups (max. 16).
2. Case A: Select process group 1 (standard for predefined configuration keys) and press ENTER.

   Case B: Select process group 3 as given in the above task and press ENTER.
   - During the following storage procedure MMI shows the following messages:
     Saving MMI Params
     Saving of Bindings/Params OK
3. Now the MMI has stored/ loaded down from the configuration key:

   Case A: Process Group 1 and
   Standard MMI access profile for the case that no user key is present (“No Key” functionality)

   Case B: Process Group 3 and
   Customer specific MMI access profile for the case that no user key is present (“No Key” functionality)
4. Remove the configuration key after successful storage.
5. From now on only User keys with the identical process group are accepted by this MMI.

Notes:

5 MMI error messages and their elimination

Error message	Possible cause	Correction measures
CA PASS FAILURE	MMI was not able to pass the control access (CA) to the selected device.	Check CA tables in the field device, CA priorities of the Gateways, MMIs, etc. Check LON bus, bindings.
DEVICE REMOVED	MMI does not receive a message within the “Field device time-out”.	Check whether device has been removed, check LON bus.
ERROR FTP PROCESS IN USE	Another MMI process uses FTP (File Transfer Protocol). For this reason, it is not possible to receive or transmit a file from the selected field device.	Wait for a while and repeat the process.
ERROR FTP:RCV PARAMETERS	MMI was not able to receive the parameter file from this device during the start phase.	Check LON bus, Routers
ERROR NOT A KNOWN DEVICE	When the MMI finds a new device on the LON network, it reads the device identifier (program ID). If this identifier is not known to the MMI, the above error message will be displayed.	Check whether MMI supports this device type and software version. Load suitable software.
ERROR NV IS UNBOUND	Binding problem.	Check bindings, reload bindings.
ERROR QUERY PROG ID	When the MMI finds a new device on the LON network, it reads the program identifier of this device (program ID), to verify if this is a known device. If this action fails, the above error message is displayed.	Check the LON bus and the device
INSTALLING NODE FAILURE	The MMI has not received a message (Service Pin Message) from the device to be installed during the wait time.	Check LON bus, check Routers, check device hardware to be installed, repeat the process.
INVALID KEY ERROR: KEY SIZE	Unprogrammed key or memory size of key not correct for key type	Use key for this particular MMI
INVALID KEY ERROR: PLANTID/PGRP	Process group or plant no. Allocated to the key does not match with process group/ plant number of MMI	Use key for this particular MMI
LOADING OF DEFAULT BINDINGS FAILURE	The MMI was not able to set the default bindings in the selected device.	Check the Routers, the LON bus, the device hardware. Repeat the process.
PARAMETER FILE RECEIVE ERROR **PARAMETER FILE SEND ERROR**	It was not possible to receive or transmit the parameter file from the selected device.	Check LON bus, Routers.
SAVING OF BINDINGS/ PARAM NOT OK	MMI was not able to save ist own parameters/bindings in the non-volatile memory.	Repeat saving process. If this trip occurs frequently, have MMI device checked in the factory.
SENDING WINK COMMAND FAILURE	The MMI was not able to send the wink command to the selected device.	Check the Routers and the LON bus. Check whether the device is properly connected to the bus.
SWITCH DEVICE OFF/ONLINE ERROR	MMI was not able to switch the device offline before sending the parameter file or online after sending.	Check the field device (physically removed?), check LON bus.
TOO MANY NODES ON THE NETWORK	A maximum number of 128 field devices plus 16 backplane mounted devices may be handled by the MMI. If the maximum is exceeded, the message shown above will be displayed.	Remove the excessive devices. Delete these devices from the device list.

Notes:

6 Annex A - Technical Data

6.1 Mechanical data

Dimensions of the front panel (W x H x D)	240 x 140 x 5 mm
Dimensions of the housing (W x H x D)	210 x 105 x 85 mm
Weight	ca. 1 kg

6.2 General electrical data

Power supply	24 V DC (18 – 36 V DC)
Power consumption	approx. 5 W
Nominal current:	170 mA
Inrush current	< 350 mA
Operating temperature	-5 – +70 °C
Storage temperature	-20 °C – +80 °C
Degree of protection	IP 21
MTBF	15 years

6.3 Electromagnetic Compatibility

Standard	Subject		Level	Class	Criteria
EN 50081-1	0,15-0,5 MHz	(230VAC *)	79/66 dBuV	B	-
	0.5 – 30 MHz	(230VAC *)	73/60 dBuV	B	-
EN 50081-1	30 – 230 MHz	(Case)	30 dBuV	B	-
	230 – 1000 MHz	(Case)	37 dBuV	B	-
EN 61000-4-2	Contact discharge		< 4 kV	2	C
	Air discharge		< 8 kV	3	C
EN 61000-4-3	Sinus modulation		10 V/m	3	A
EN 61000-4-4	230 VAC *		4 kV	4	A
	24 VDC power supply lines		2 kV	3	A
	Lon XP 1250		2 kV	4	A
EN 61000-4-5	230 VAC * Asymetrical / symetrical		2/1 kV	3	A
	24 VDC power supply lines Asymetrical / symetrical		1/0.5 kV	2	A
	LON FTT10		1 kV	3	A
EN 61000-4-6	230 VAC *		10 V	3	A
	24 VDC		10 V	3	A
	Lon XP 1250		10 V	3	A
EN 61000-4-11	230 VAC *	70 % Un	10 ms	A	-
		40 % Un	1000 ms	A	-
		<5 % Un	5000 ms	C	-
PR EN 61000-4-29	Voltage dips 24 VDC	70 % Un	1000 ms	A	-
	Voltage dips 24 VDC	40 % Un	100 ms	A	-
	Voltage dips 24 VDC	<5 % Un	30 ms	A	-

* only with power supply unit 1TGB 302006

Notes:

6.4 Insulation test

Standard	Subject	Reference Point	Level	Class
IEC 60255-5 chap.4	24 V DC	Ground plane	+/- 0.8 kV	3
	24 V DC	Internal bus lines	+/- 0.8 kV	3
	Bus lines	Ground plane	+/- 0.8 kV	3

6.5 Environmental testing

Subject	International Standard	European Standard
Vibration (sinusodial)	IEC 255-21-1	
Shock and bump	IEC 255-21-2	
Cold	IEC 68-2-1	EN 60068-2-1
Dry heat	IEC 68-2-2	EN 60068-2-2
Vibration (sinusodial)	IEC 68-2-6	EN 60068-2-6
Damp heat, cyclic	IEC 68-2-30	EN 60068-2-30

6.6 Accessories

MMI-MP connection cable	1TGB366001R0002 (already included in MMI kit)
Connection cable between MMIs	1TGB366001 with specified length
Bus termination connector	1TGB364022R0001 (already included in MMI kit)
GW/MMI download cable	1TGB366001R1001

6.7 Assembly

In accordance with drawing 1TGB362003 (P1 module door size 8E).

6.8 Modules constituting the MMI

The device is composed of the following function modules:

- Microcontroller MC68331 (processing core CPU32), 19.68MHz clock rate
- 1 MByte Flash memory
- 1 MByte SRAM, with battery back-up
- NEURON 3150, 10 MHz clock rate
- LON Interface TC/TP-1.25M
- LON Watcher Interface
- Function monitoring by watchdog and voltage monitoring
- Background Debugger Interface (BDM)
- Status display (LED) and push-buttons
- LCD display with background lighting
- Membrane keyboard
- LEDs for status display
- Optical encoder
- Download interface
  9-pin SubMinD female physical RS232; baudrate 19.2 fixed. Detection via jumper in download cable
- Step-down controller for power supply

Notes:

7 Annex B - INSUM Terms and Abbreviations

Abbreviation	Term	Explanation / Comments
	Alarm	Alarm is defined as status transition from any state to abnormal state. Status transition to abnormal state can be data crossing over the predefined alarm limit.
	Backplane	INSUM backbone, holds following INSUM devices: Router, Gateways, Clock, Power supply. Part of the INSUM Communication Unit, see ICU
CA	Control Access	A function of INSUM system that allows definition of operating privileges for each device level (e.g. PCS, Gateway, field device)
CAT	Control Access Table	Table containing control access privileges
CB	Circuit Breaker	Circuit breaker unit (here: ABB SACE Emax with electronic release PR112-PD/LON)
CT	Current Transformer	Current Transformer
DCS	Distributed Control System	see also PCS
Eth	Ethernet	Ethernet is a local area network (LAN) technology. The Ethernet standard specifies the physical medium, access control rules and the message frames.
	Event	An event is a status transition from one state to another. It can be defined as alarm, if the state is defined as abnormal or as warning as a pre-alarm state.
FD	Field Device	Term for devices connected to the LON fieldbus (e.g. motor control units or circuit breaker protection)
FU	Field Unit	see Field Device
GPI	General Purpose Input	Digital input on MCU for general use
GPO	General Purpose Output	Digital output on MCU for general use
GPS	Global Positioning System	System to detect local position, universal time and time zone, GPS technology provides accurate time to a system
GW	Gateway	A Gateway is used as an interface between LON protocol in INSUM and other communication protocols (e.g. TCP/IP, Profibus, Modbus)
HMI	Human Machine Interface	Generic expression for switchgear level communication interfaces to field devices, either switchboard mounted or hand held
ICU	INSUM Communications Unit	INSUM Communications Unit consists of devices such as backplane, Gateways, Routers, System Clock and Power supply. It provides the communication interface within INSUM and between INSUM and control systems. Formerly used expressions: SGC, SU
INSUM	INSUM	Integrated System for User optimized Motor Management. The concept of INSUM is to provide a platform for integration of smart components, apparatus and software tools for engineering and operation of the motor control switchgea
INSUM OS	INSUM Operator Station	Tool to parameterise, monitor and control devices in the INSUM system
ITS	Integrated Tier Switch	The Intelligent Tier Switch is an ABB SlimLine switch fuse with integrated sensors and microprocessor based electronics for measurement and surveillance
LON	Local Operating Network	LON is used as an abbreviation for LonWorks network. A variation of LON is used as a switchgear bus in the INSUM system

Notes:

Abbreviation	Term	Explanation / Comments
LonTalk	LonTalk protocol	Fieldbus communication protocol used in LonWorks networks
LonWorks	LonWorks network	A communication network built using LonWorks network technology, including e.g. Neuron chip and LonTalk protocol
MCU	Motor Control Unit	Motor Control Unit is a common name for a product range of electronic motor controller devices (field device) in INSUM. A MCU is located in a MNS motor starter, where its main tasks are protection, control and monitoring of motor and the related motor starter equipment.
MMI	Man Machine Interface	The switchgear level INSUM HMI device to parameterize and control communication and field devices.
MNS	MNS	ABB Modular Low Voltage Switchgear
	Modbus, Modbus RTU	Fieldbus communication protocol
NV,nv	LON Network Variable	Network variable is a data item in LonTalk protocol application containing max. 31 bytes of data.
Nvi, nvi	LON Network Variable input	LON bus input variable
Nvo, nvo	LON Network Variable output	LON bus output variable
OS	Operator Station	see INSUM OS
PCS	Process Control System	High level process control system
PLC	Programmable Local Controller	Low level control unit
PR	Programmable Release	Circuit breaker protection/release unit (here: ABB SACE Emax PR112-PD/LON)
	Profibus DP	Fieldbus communication protocol with cyclic data transfer
	Profibus DP-V1	Fieldbus communication protocol, extension of Profibus DP allowing acyclic data transfer and multi master.
PTB	Physikalisch-Technische Bundesanstalt	Authorized body in Germany to approve Ex-e applications.
PTC	Positive Temperature Coefficient	A temperature sensitive resistor used to detect high motor temperature and to trip the motor if an alarm level is reached.
RCU	Remote Control Unit	Locally installed control device for motor starter, interacting directly with starter passing MCU for local operations.
	Router	Connection device in the LON network to interconnect different LON subnets. Part of the INSUM Communications Unit.
RTC	Real Time Clock	Part of the INSUM System Clock and and optionally time master of the INSUM system
SCADA	Supervisory Control and Data Acquisition	
SGC	Switchgear Controller	Former term used for INSUM Communications Unit
SU	Switchgear Unit	Former term used for INSUM Communications Unit
	System Clock	INSUM device providing time synchronisation between a time master and all MCUs. Part of the INSUM Communication Unit, see ICU
TCP/IP	Transmission Control Protocol /Internet Protocol	TCP/IP is a high-level, connection oriented, reliable, full duplex communication protocol developed for integration of the heterogenous systems.
TFLC	Thermal Full Load Current	See MCU Parameter Description for explanation
TOL	Thermal Overload	See MCU Parameter Description for explanation

Notes:

Abbreviation	Term	Explanation / Comments
	Trip	A consequence of an alarm activated or an external trip command from another device to stop the motor or trip the circuit breaker.
UTC	Coordinated Universal Time	Coordinated Universal Time is the international time standard, formerly referred to as Greenwich Meridian Time (GMT). Zero (0) hours UTC is midnight in Greenwich England, which lies on the zero longitudinal meridian. Universal time is based on a 24 hours clock.
VU	Voltage Unit	Voltage measurement and power supply unit for MCU 2
	Wink	The Wink function enables identifcation of a device on the LON network. When a device receives a Wink-message via the fieldbus, it responds with a visual indication (flashing LED)

Notes:

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