LIGHTING SOLUTIONS

LiCS OUTDOOR

Operating Manual iCTI

**R3.01 iCTI Configuration Software
iCTI-R Hand-held Programming
Device**

LIGHTING SOLUTIONS

LiCS OUTDOOR
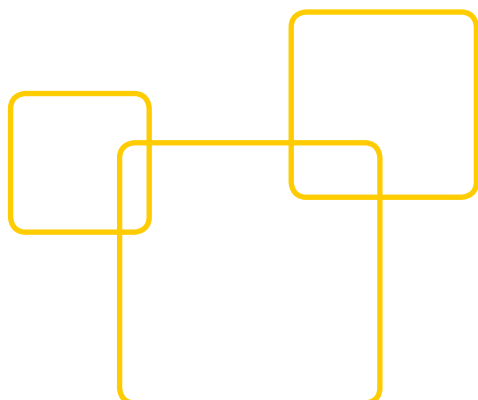
Introduction

Thank you for choosing the LiCS system made by Vossloh-Schwabe. Please read this operating manual to acquaint yourself with the product functions and to enable more effective use to be made of it prior to first using the software. Once you have read it, please keep this manual in a safe place for future reference. All personnel tasked with the set-up, commissioning, operation, maintenance and repair of this system must

• be suitably qualified and

• closely observe the instructions found in this manual.

This manual is for the new R3.01 iCTI parameter setting software, which will become available in combination with the iCTI-R hand-held programming device in July 2017. The software is not compatible with earlier versions and use with already delivered iMCUs will lead to an automatic software update. Should you have already purchased the iCTI software, Vossloh-Schwabe offers an update service as part of the package. Further details on this topic can be found under point 10.2.

Symbols used in this Manual

This manual contains the following symbols, which are used to explain procedures, limitations, safety measures and instructions and must be observed for safety reasons.

IMPORTANT — Marks important points and restrictions that must be observed. To ensure problem-free operation of the system and/or individual components, these points should be read with care.

NOTE — Marks additional information regarding system operation and/or the operation of individual components. You are recommended to read these points.

Abbreviations used in this Manual

➲ LiCS = Lighting Control Solutions

➲ DALI = Digital Addressable Lighting Interface

➲ iMCU = Intelligent Multifunctional Controller

➲ DST = Daylight Saving Time

➲ URL = Uniform Resource Locator

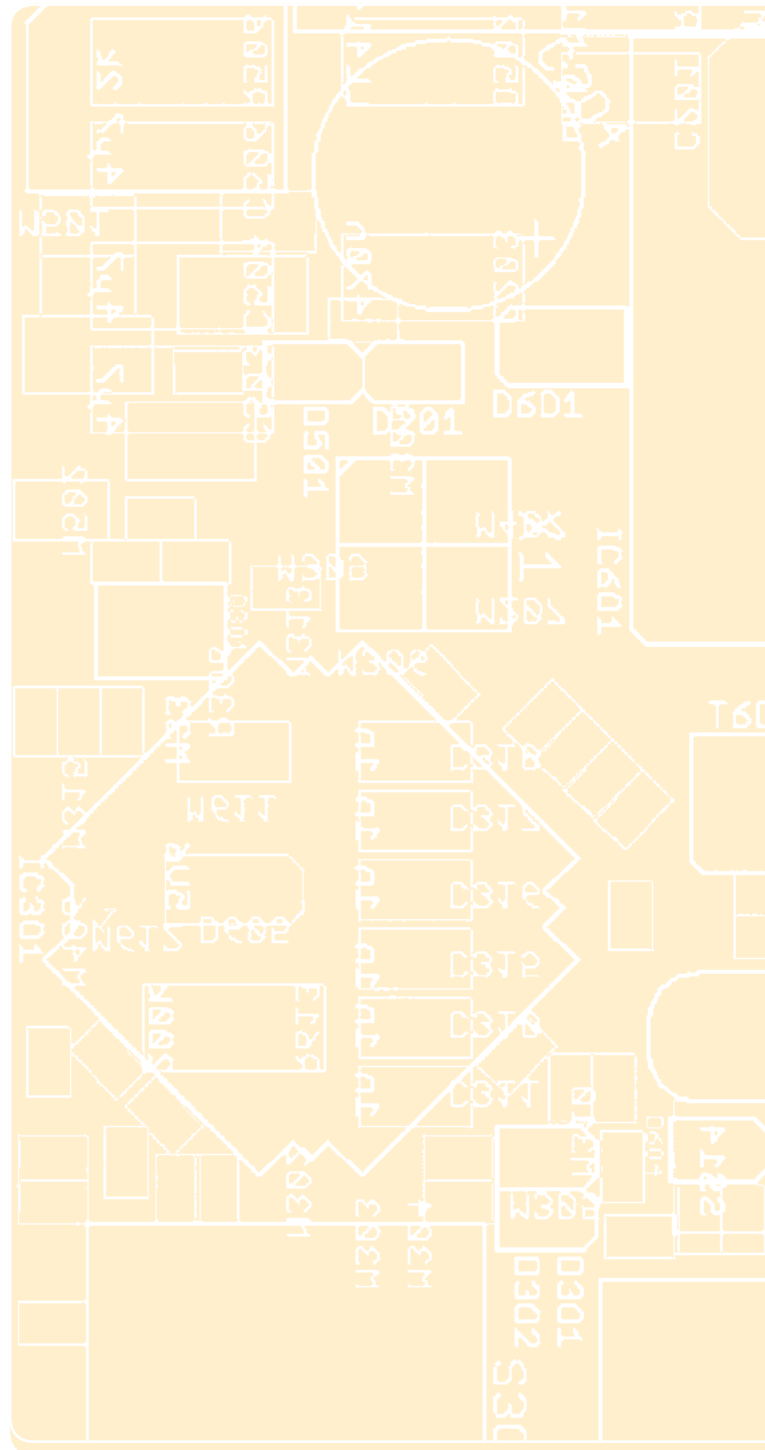➲ CET = Central European Time

➲ NTP = Network Time Protocol

■ LEGAL NOTES

Trademarks
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VS LIGHTING SOLUTIONS

■ **1. GENERAL INFORMATION**

The iMCU is a multifunctional luminaire controller for street lighting and lighting in the vicinity of buildings. It can be used to control luminaires with magnetic and electronic ballasts with a 1–10V, DALI or a PWM interface. It is individually programmable and updateable, and pro-vides all the functions of a light management system. The controller is a standalone application and requires no lengthy installation process. Operation and parameter settings are effected in the simplest form via a GUI. Data transfer is either effected directly using a USB interface or via a hand-held operating device, which then transfers parameters to the iMCU controller.

1.1 Typical iCTI Features
• Updating the iMCU firmware

• Setting the parameters of all functions

• Exporting function parameter settings and transferring these to the PC software

• iCTI firmware updates can only be carried out by Vossloh-Schwabe

• In versions purchased after July 2017, the R function (remote function) will have been unlocked. Versions purchased prior to this date can be upgraded by Vossloh-Schwabe for a fee.

1.2 Typical iCTI USB Features / Differences to the iCTI
• Exporting the logged functions
  A) Luminaire switching on time
  B) Switching on frequency
  C) Max. operating temperature
  D) Max. time operating temperature was exceeded

• Exporting the serial number

• Data cannot be stored on the USB drive

• Only works in combination with a PC

• Does not support the remote function

1.3 iCTI Remote Layout for Laboratory Tests
• Requirement:
  update of the iCTI firmware for products purchased prior to July 2017.

• Software version R-3.01 or younger

• The start screen will now display a new button, labelled as follows: *Go2Loc // *Go2Rem

• Transfer of the reduced scope of functions by switching the voltage supply line on/off
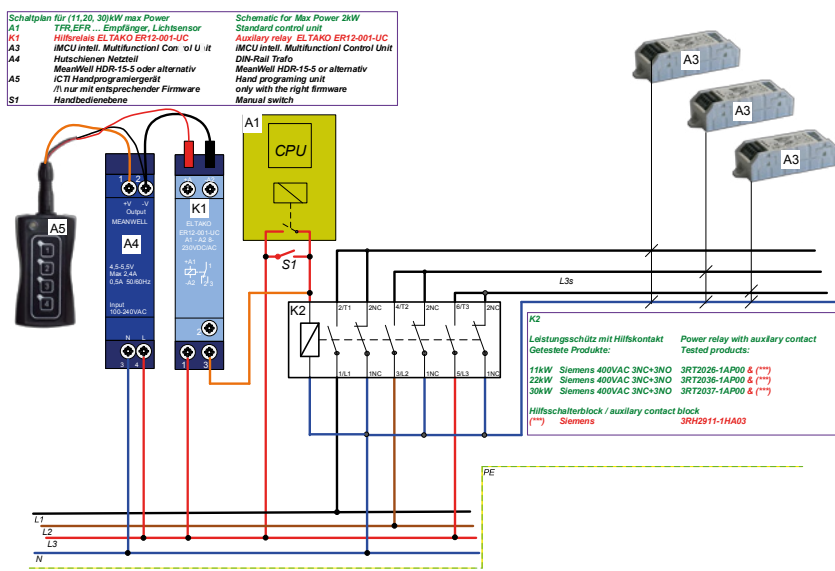
■ 2. SOFTWARE AND HARDWARE INSTALLATION

2.1. Software Installation
The current iMCU programming software can be downloaded from:
www.vossloh-schwabe.com

The software runs without requiring prior installation. Loading/opening the *.exe file therefore suffices in order to start working. Please unzip the *.zip file in a directory of your choice and if necessary create a desktop icon.

2.2. Hardware Installation
Connect the included cable with a free USB port and remove the programming adapter from the iCTI.
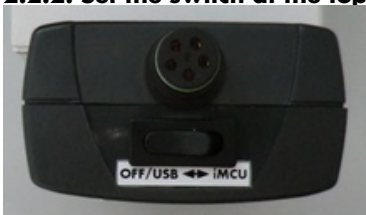

IMPORTANT   The programming adapter is inserted and must not be rotated.

Then push the circular connector onto the coupling of the hand-held programming device.
The yellow LED should now light up irrespective of the switch position.

2.2.1. Remove the programming adapter without rotating it from the iCTI

2.2.2. Set the switch at the top of the iCTI to OFF/USB

2.2.3. Connect USB cable without rotating it to the iCTI; the LED will light up in constant yellow.

Depending on the version of the Microsoft® operating system you are running, the automatic installation of the required USB driver can take a few minutes, but should always occur automatically and be confirmed with a text in a message box. Should installation not have taken place as described above, please contact your IT department since it is possible that the USB ports were blocked for security reasons.

■ **3. SOFTWARE**

3.1 Starting the Software
Start the iMCU programming software with a double click on imcu_pgm_vxxx.exe
Should your iCTI not be recognised/not have been properly installed, a message will appear in the top left-hand corner
that the software is running in DEMO mode.

Possible causes can be:
• iCTI is not properly connected or the cable is damaged
• USB port is blocked (contact the IT department)
• AtUsbHid.dll is missing in the installation directory
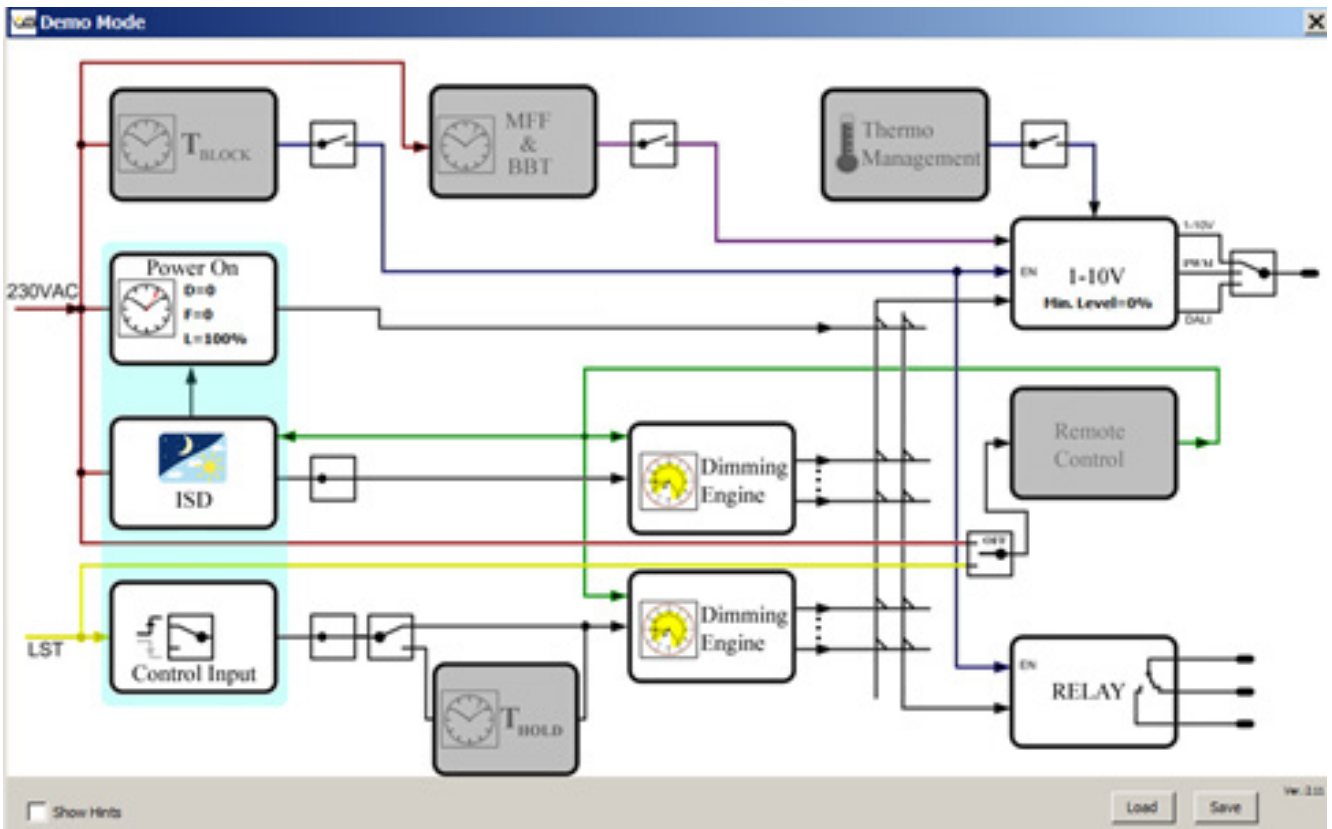
Once communication has been established between the PC and the iCTI, the data are exported from the iCTI. The following screen will
appear a short time later. The main difference in the version available as of July 2017 consists in the fact that besides the four programming
slots M1 to M4 at the bottom, in addition the G2Rem or Go2Loc button will appear.

Please follow the instructions contained in this chapter to set the iMCU controller's parameters for the first time.
The Go2Rem button should be visible as shown in the screenshot above.

3 Software

If parameters need to be reset at a later point in time when the iMCU is already installed in the luminaire and in the field, please follow the instructions provided in the Go2Rem chapter further on in this document. The Go2Loc button should be visible as shown in the screenshot below.
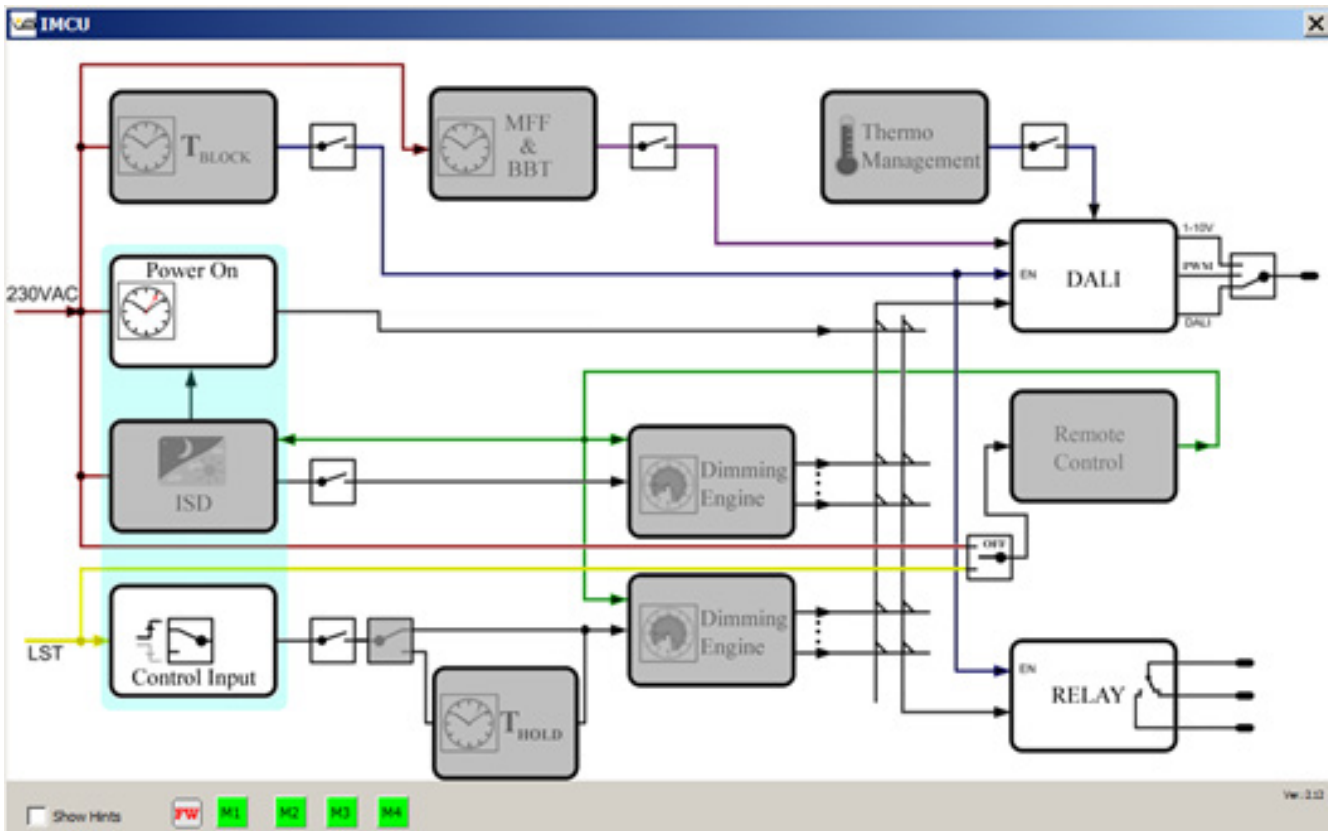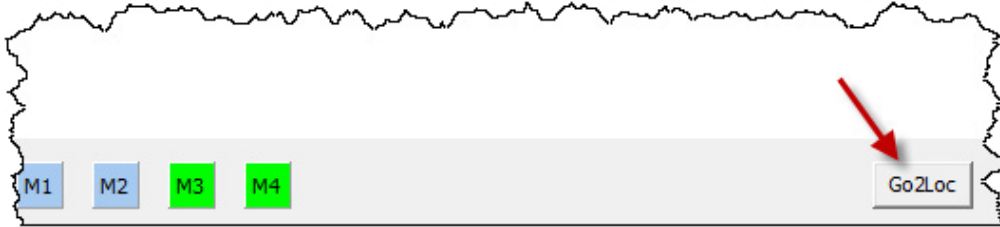
3.2 Select Storage Location

For parameter setting purposes or to import previously made parameter settings from the hard disk, it is necessary to first
select the storage locations (M1 to M4). In this respect, M1 corresponds to the iCTI's 1st button, etc.. As the iCTI USB does not feature any
buttons, the screen will not provide any buttons M1 to M4 for selection, either. The various configurations must be saved in separate configu-
ration files in such a case.

Please proceed to select a respective storage location, after which a new button bar will appear for the file operations. All parameters will
be taken over from the selected iCTI storage location.
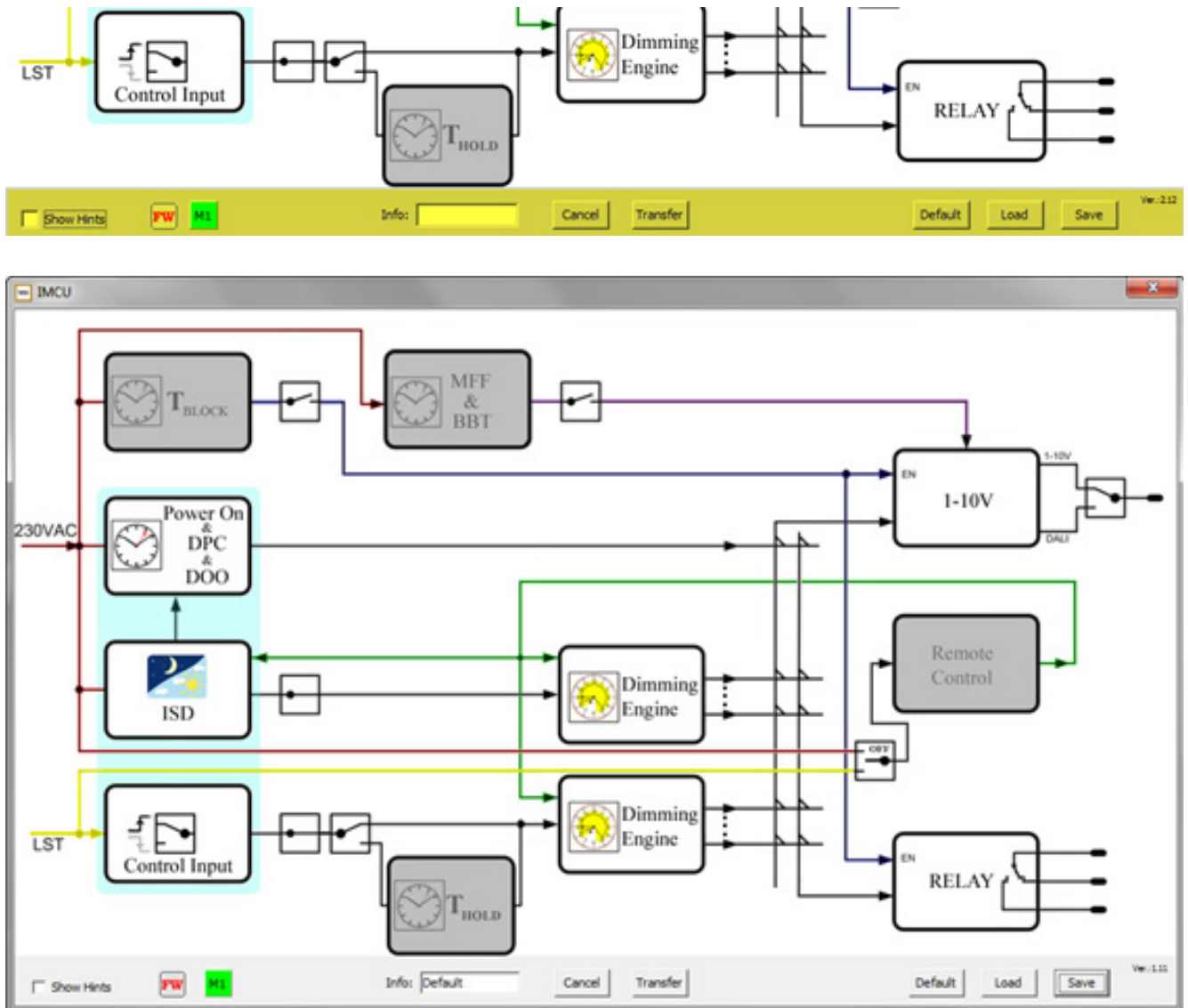
■ 4. FUNCTIONS

4.1 Functions of the Button Bar (File Operations)

[Cancel]
Cancels the current operation. Without saving, return to the "iMCU's newly connected state. ".

[Transfer]
All program parameters will be transferred to the selected iCTI storage location.
The program will then restart and reimport the data that were actually transferred, which makes real control possible.

[Default]
All program and iCTI parameters will be returned to their default settings (following confirmation).

[Load]
An already created parameter file can be loaded. All program parameters will be overwritten. A dialogue window will open to select the *.vsc parameter file. The pull-down menu at bottom right also provides the option of loading a different firmware for the iMCU. Firmware is integrated into the iCTI *.exe file by default. However, should you want an older or BETA version to be transferred, this can be explicitly selected.

IMPORTANT   Please use this function with great care!
There is no way in which the firmware version that has been loaded can be shown by the iCTI at a later date!

NOTE   Firmware loaded onto one of the storage locations is always used for all 4 storage locations.

[Save]
Saves the current configuration as a parameter file. A dialogue window will open to select the storage location and to give the *.vsc parameter file a name.

[FW]
Mousing over the info button will provide information on the iMCU's current firmware (e.g. [Version 1.28]). Should an older version have been saved to the connected iCTI, this will be marked by the addition "Update". In this case, the current firmware will be automatically transferred to the iCTI during the next "Transfer". The firmware is already contained in the programming software and does not have to be loaded separately.

[Show Hints]
If this checkbox has been enabled, mousing over the individual programming blocks will provide a short description.

[Info]
This field lets you enter a short description (max. 8 characters) for the parameter file.

5 Programming

■ **5. PROGRAMMING PARAMETERS**

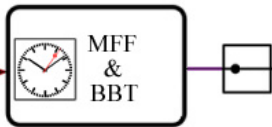**5.1. General Programming Commands**
5.1.1. Switches
These switches serve to activate and deactivate program blocks with a click of the mouse and/or to switch between functions.
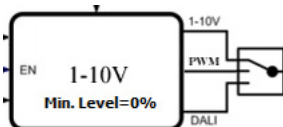
Examples:
Activating a function block:

If the switch is open, the function block will be inactive and displayed in grey.
If the switch is closed, the function block will be active and it will be possible to make settings in it.

Switching over a Function Block

e.g.: switching the communication protocol to the ballast/driver from DALI to 1–10 Volt and vice versa.

5.1.2. Confirmation and Help Fields within the Program Blocks

Green tick: accept settings
Red prohibition sign: cancel
Yellow question mark: help graphic
This help graphic provides a visual overview of the setting options of the current function block.

5.1.3. Timed Functions

All times must be set using the slider. The total time period can be set via the dropdown menu.
It is not possible to enter a numerical value via the keyboard.

5.1.4. Fading / Transition Times

All fading times must be set using the slider. The total time period can be set via the dropdown menu. Fading times are set per individual step (%). It is not possible to enter a numerical value via the keyboard. A transition from 0% to 100% takes 100 seconds. Example: Fade Speed 1 s/step means that a transition from 70% to 80% takes 10 seconds.

5.1.5. Fading calculation

In iMCU's dimming settings there is an ability to use a fade between two different dimming levels. To activate the fade you must set a non-zero *Fade Speed* in units of [s/%].
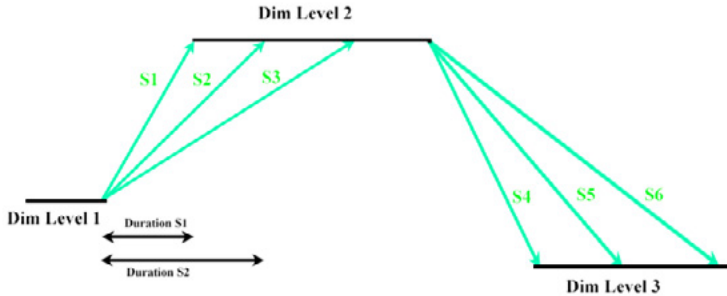
The fade duration is always the absolute difference between the dimming levels multiplied with the fade speed:

Duration [s] = ABS(DimLevel$_A$ [%] − DimLevel$_B$ [%]) x FadeSpeed [s/%]
or
FadeSpeed [s/%] = Duration [s] / ABS(DimLevelA [%] − DimLevelB [%])

Examples:
1. Dimming from 0% to 100% with fade speed 0.600 s/%:
Duration = ABS(0-100) x 0.6 = 100 x 0.6 = 60 s

2. Dimming from 75% to 90% with fade speed 0.120 s/%:
Duration = ABS(75-90) x 0.12 =15 x 0.12 = 1.8 s

3. Dimming from 100% to 50% in 10 seconds:
FadeSpeed = 10 / ABS(100-50) = 10 / 50 = 0.5 s/%

4. Dimming from 20% to 65% in 1 second:
FadeSpeed = 1 / ABS(20-65) = 1 / 45 = 0.0222 s/% > the nearest possible value is 0.022 s/%

5.2. Program or Function Blocks
5.2.1. Blocking Time/T-Block
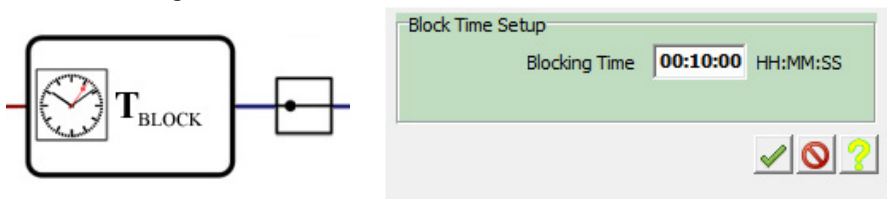
T-Block lets you set a blocking time during which – after switching the lighting system on – it will be impossible to reduce output (dimming). This function is, for instance, designed for use with sodium-vapour lamps, which must not be operated at reduced output during the first few minutes after switching on.

5 Programming

5.2.2. Maintenance Factor "MFF" and Burn-in Blocking Time "BBT"
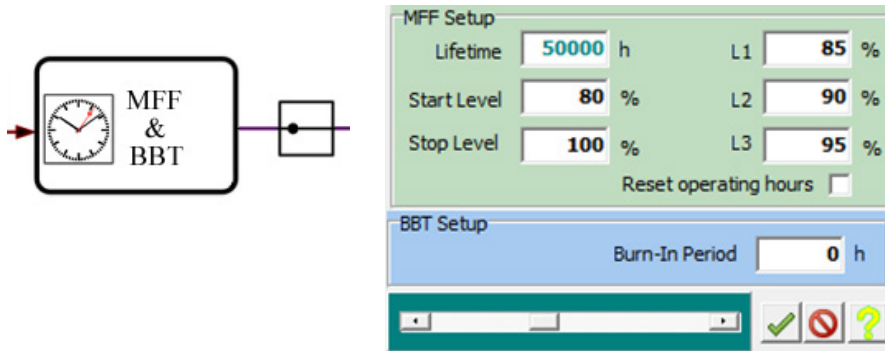
MFF lets you set the maintenance factor to compensate for the lamp's decrease in luminous flux.

Example: according to the manufacturer's specifications, the luminous flux of a connected LED module will reduce by 20% over 50,000 hours.
The maintenance factor is then set to increase the output of the connected driver by 20% over 50,000 hours.

As luminous flux usually decreases in a non-linear manner, three further support points can be set using L1.... L3
so that account can be taken of the non-linearity of the connected light source.
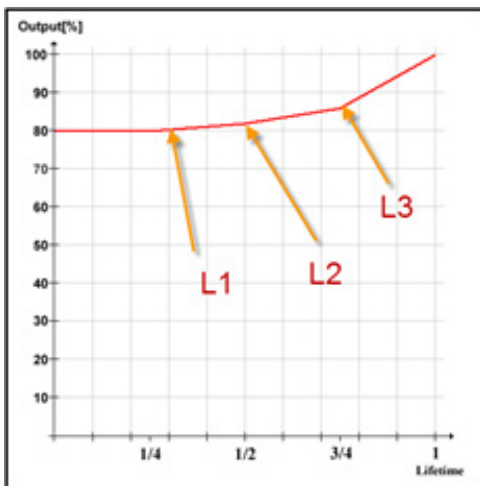
The "Reset operating hours" checkbox can be used to reset the iMCU's operating-hour counter. If the checkbox is enabled, the counter will be reset (only once) when the system is next switched on.

The "Burn-in Block" function lets you set a burn-in time for the light source. For a sodium vapour lamp you can, for instance, specify that output must not be reduced during the first 100 hours of operation in the interest of maximising the lamp's service life.

### 5.2.3. Delayed Power On with Random Function "Power On & DPC & DOO"
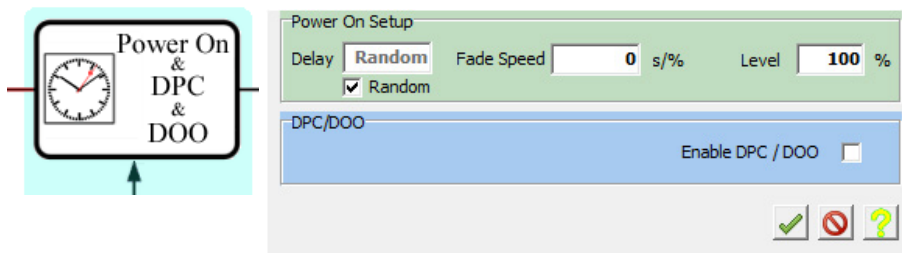
The Delay function lets you set a delayed switching on time. This means that the connected driver will only be switched on after the set time. The fading value and the light output value on power up can also be set here.

With DPC/DOO, the set values are also used to switch off the connected ballast/driver at an earlier point in time. Typical applications of the DPC/DOO function are for areas adjacent to pedestrian crossings. If the street lighting of a city is to be switched on at a constant 40 Lux, this would correctly apply to the pedestrian crossings and its adaptation path. All areas not within this zone could be switched on later and switched off earlier with a "Delay" of, for instance, 10 minutes.

The random function allows the controller (relay) to be switched on at random. In this case the controller calculates a random number from 0 ... 15 and switches the relay close to the zero crossing within 0..150 msec. High inrush current peaks of various drivers on the market can thus be spread over this period of time.

### 5.2.4. ISD (Intelligent Switching Time Dimming)
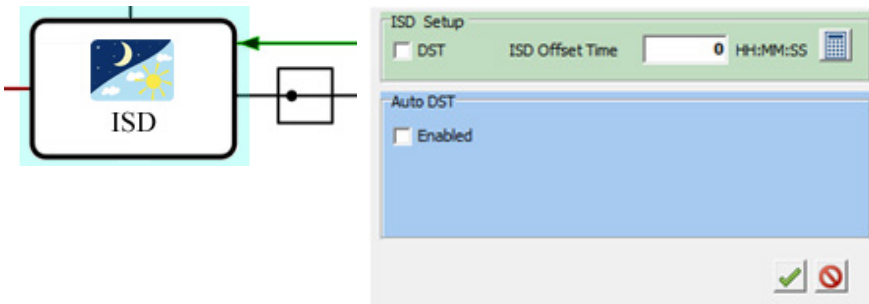
The ISD function lets you determine the precise location of the lighting system. This is necessary so that geographical deviations within the time zone can be compensated during astronomic calculation of switching on and off times.

Entry of the installation location is started by clicking on the calculator symbol.
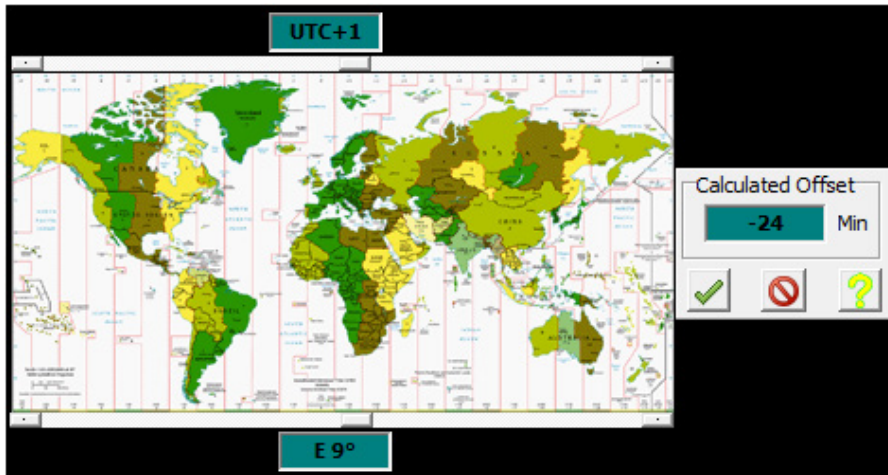
The top slider is used to set the time zone, the bottom slider to set geographical longitude.
The determined value is then accepted with a click on "Confirm".
The values shown here are example values for the Stuttgart location in Germany:
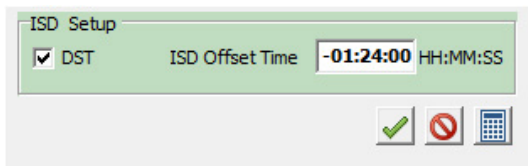
The "DST" checkbox lets you set the astronomic calculation function to daylight saving time.
If the checkbox is not enabled, standard time will be used for switching purposes.
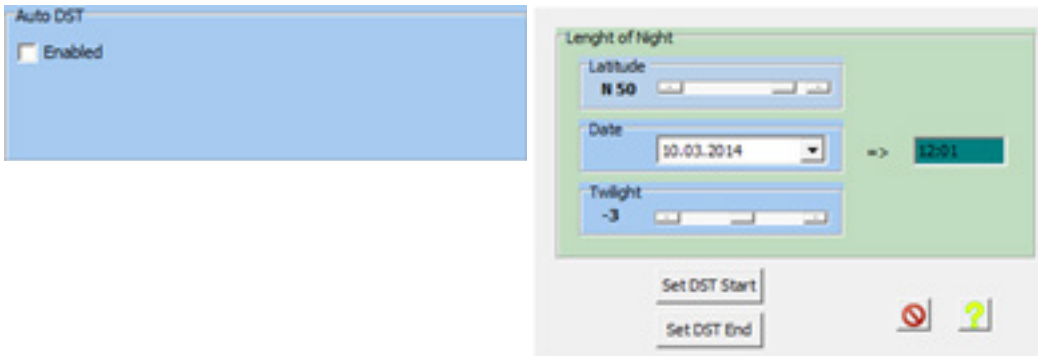
Latitude: the "Auto DST" function lets the system switch automatically from standard to daylight saving time, and vice versa. Using this function requires entering the latitude of where the products are used in the luminaires.

Date: in order for the system to calculate the length of the night for the ST/DST switch, it is necessary to enter dates that are near the change from DST to > ST and ST to > DST. As the change always takes place on a weekend and the date is therefore moveable in line with the EU definition, it makes sense to determine the mean value for the next five years and to enter this as a date.

"Twilight/Dusk" refers to the seamless transition between day and night just before dawn or just before nightfall. This twilight effect is created by the refraction of light in the atmosphere. On the basis of measured values, approx. 20 Lux were ascertained given −3° and atmospheric refraction. Depending on the parameters of the light sensor that switches municipal lighting, the value can be adjusted. Further explanatory information can be found on Wikipedia.

5.2.5. Dimming Sequence / Normal Operation
Dimming Engine 1 (upper function block)

Switching times and dimming levels for normal operation are defined in "Dimming Engine 1". Times must be entered in chronological order. A fading, a dimming level and a switching state for the switching relay must be entered for each switching time.

To activate a switching time, click in the "Level"field, to deactivate place a right click in the space next to the "Level"field.

5.2.6. External Input /Control Input Function
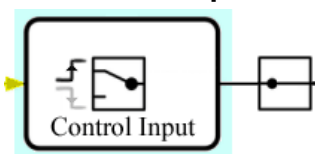
This function block lets you set whether the L_{st} signal input responds to a rising or a falling flank. A switch will take place per click of the mouse.

5 Programming

5.2.7. Holding Time/Time Delay for the External Input
T-Hold Function Block
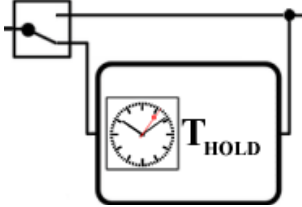
The T_{Hold} function block lets you set the length of time for which the switching signal is applied to L_{st}.
Should T_{Hold} not have been activated,
the switching signal will only be carried out for as long as the signal is applied to L_{st}.
Example: motion sensor at L_{st}. If T_{Hold} is not activated, the switching signal will only be carried out for as long as the sensor's signal is applied. If T_{Hold} is set to 15 minutes, the switching state will be held for 15 minutes.

5.2.8. Dimming Sequence External Input
Dimming Engine 2 (lower function block)

Dimming Engine 2 lets you specify the switching period and the dimming steps for the external L_{st} input. Times are then processed one after the other. For each switching period, a fading, a dimming level and a switching state for the switching relay can be specified.

Switching periods are activated by clicking in the "Level"field, deactivation is achieved with a right click in the space next to the "Level"field.

5.2.9. Parameter Settings for Information Transfer to the Ballast/Driver
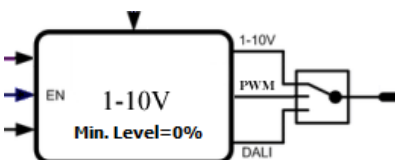
Clicking on the switch will set the system to DALI, PWM (pulse width modulation) or 1–10 Volt.
Example: as shown in the image = 1–10 V output is active.

5 Programming

5.2.10. Remote Programming/Remote Control

The Remote Control function lets you set the parameters of various function blocks using the voltage supply line. A Vossloh-Schwabe-specific protocol enables data transfer after switching the voltage supply line on and off. This protocol can be made available after signing an NDA.

If the switch is in this position, it is possible to carry out remote parameter settings for the following functions at a later date:
• Power ON/OFF
• Switch ON/OFF like in Dimming Engine (1)
• Switch ON/OFF like in Dimming Engine (2)
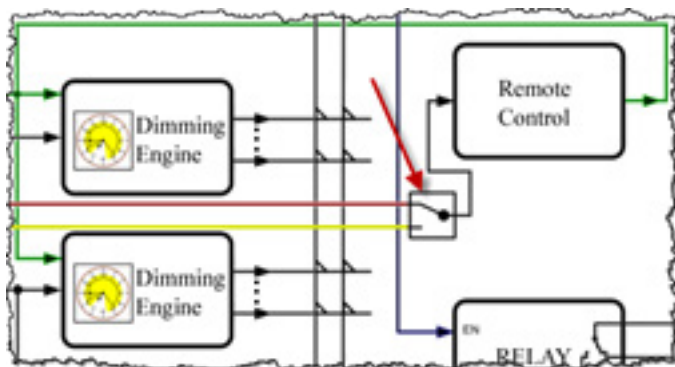
If the switch is in the bottom position, lighting can be dimmed dynamically at a later date via the L_{ST} control cable and a time-length signal of 5 to 60 seconds. After activation, ISD, dimming engines I and II as well as the control input will be deactivated.

6 Transfer

■ **6. PARAMETER TRANSFER FROM THE iCTI TO THE iMCU**

- Remove cable without rotating it from the iCTI.
- Push on programming unit without rotating it. Unscrew protective cap. Turn switch to iMCU.
- The LED flashes in yellow.
- Press Transfer: after data transfer has been completed, any number of iMCUs can be updated or parameter settings undertaken.

- Select the storage location by pressing on the corresponding button. The LED next to the storage location will light up in red.
- The styluses of the programming unit must be gently pressed into the iMCU's +da and –da terminals.

The keypad must show upwards (see images) to this end. The LED flashes red. The system will then automatically check whether the iMCU's firmware is up to date. Should this not be the case, an automatic firmware update will follow (LED flashes yellow during the update), after which the parameters will be transferred (LED flashes red). The programming process takes approx. 25 – 30 seconds for a firmware update and 1-5 seconds for setting the parameters. Upon completion, the LED briefly lights up in yellow. If the transfer was successful, all LEDs at programming slots 1–4 will briefly light up, after which the red LED next to the storage location will go out, which signals that the transfer was successful. Depending on the quality of the batteries used, the parameters of up to 1,000 iMCUs can be set.

- Further iMCUs can be programmed if required.
- Once programming has been completed, turn the switch back to the "OFF/USB" position (LED is off).
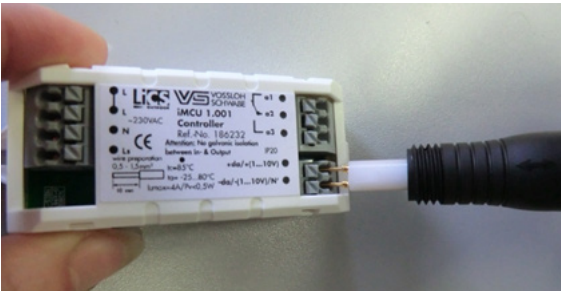
7 Export

■ **7. EXPORTING PARAMETERS FROM THE iMCU TO THE iCTI**

7.1.
• Remove the cable without rotating it from the iCTI.
• Push on programming unit without rotating it, unscrew protective cap. Turn switch to iMCU.
• The LED flashes yellow.

7.2.
• Select the storage location with a long press of the corresponding button.
• The LED next to the storage location flashes red.
• The storage location will be deleted.

7.3.
The styluses of the programming unit must be gently pressed into the iMCU's +da and –da terminals.
The key pad must show upwards (see images) to this end. The LED flashes red. The parameters are exported from the iMCU (LED flashes red). Once the export process has been completed (after a few seconds), the LED will briefly light up in yellow. All LEDs at programming slots 1–4 will flash and the red LED next to the storage location will go out. Parameter export is completed.


7.4.
The exported parameters can be transferred to the PC with the programming software and can be edited and/or saved. Parameter transfer to an iMCU controller will only become possible once a transfer rewrites the data to the hand-held programming device.

8 Annex

■ **8 EXPLANATION OF THE REMOTE PROTOCOLS**

8.1 Remote Dimming via L$_{ST}$

In order to use the "Remote Dimming" function, please turn the function on via the shown switch.
This function enables dynamic dimming of the controller using a time-length signal.
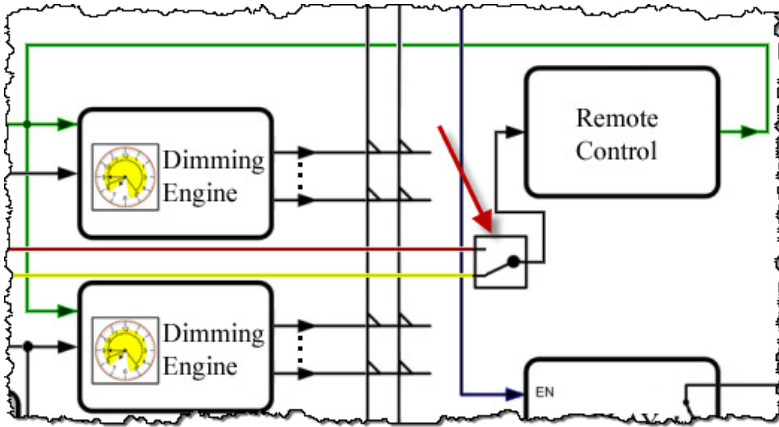
With "Remote Dimming", a control signal is applied to L$_{st}$.
Depending on the length of time the signal is applied, various processes will be triggered:
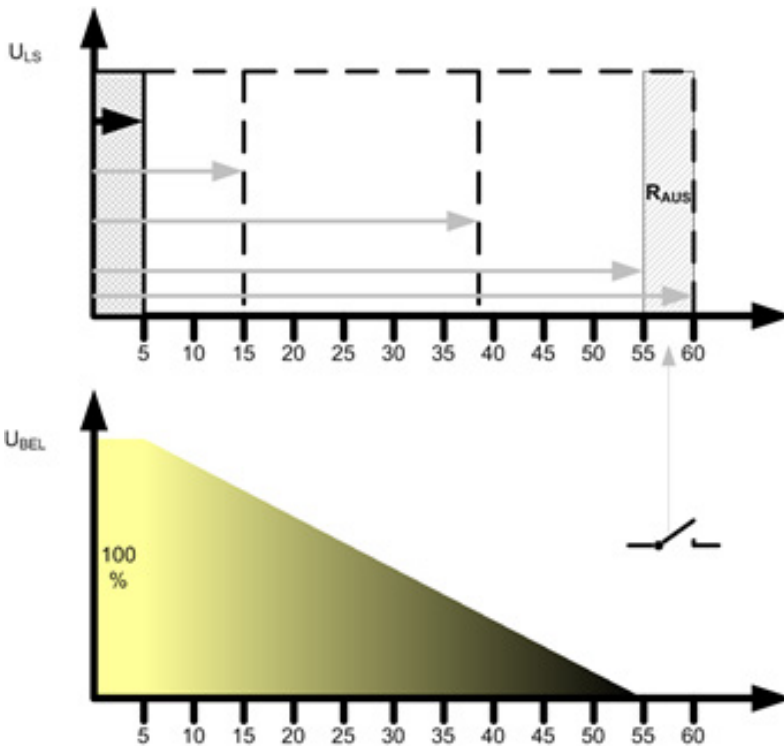
If the L$_{st}$ signal is held for five seconds, the relay will switch on and a dimming value of 100% will be set. If the signal is held for longer, the dimming level will be reduced by 2% per second. However, implementation at the output will only be effected once the signal applied to L$_{st}$ is switched off.

As an example: if you want to set a dimming value of 22%, the following calculation would apply:

100% − 22% = 88%
88% : (2%/sec) = 44 seconds

The five seconds needed to set the controller to 100% must be added to these 44 seconds.

44 seconds + 5 seconds = 49 seconds

If you wish to achieve a dimming level of 0%, the L_{st} signal must be held for 55 seconds.

If the relay is also to be switched off, the signal must be held for 56 – 61 seconds.

If the switching element that serves L_{st} is defective, the signal will be held indefinitely and the iMCU controller will go into emergency operation mode, resulting in the lighting being dimmed up to 100% and the relay being switched on. Only useable signals of 5 to 60 seconds will be accepted.
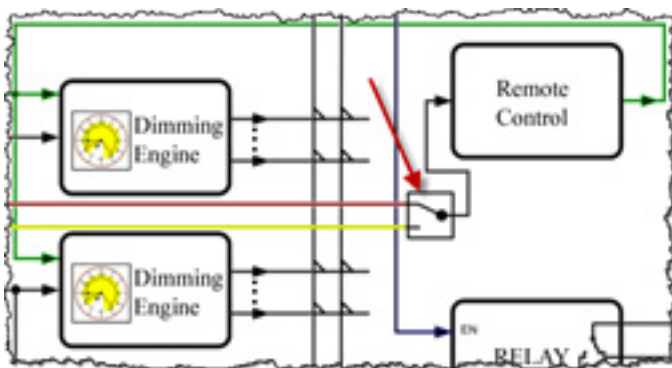
8.2 Using the "Go2Rem" Function

If you wish to reset the parameters of all iMCU's connected to a single voltage supply line, you will have turned the switch to this position as described in point 5.2.10.

NOTE This is the only setting that will permit subsequent transfer of new values to the iMCU controller by switching the voltage supply line on and off.

While it is possible to directly transfer data to every iMCU controller using the iCTI, parameters can also be transferred via ON/OFF commands using the hand-held programming device, thanks to the new firmware and external products such as a power-supply unit and an interface relay. The parameters of all iMCUs connected to a common voltage supply line can thus be reset if the remote control switch was turned to the upper position. This applies to all connected products in one-, two- or three-phase operation.

In order to prepare the iCTI for in-field data transfer, please select the "Go2Rem" function when starting the software.

NOTE If the button does not appear, the reason will be as follows:
the iCTI's firmware is not up to date because you purchased the device before July 2017. Vossloh-Schwabe will be happy to update the device for a fee and will deliver all products required for operation as part of the bundle. These products include a programming cable, 5 V top-hat rail power supply unit as well as a separate interface relay. Please contact your Vossloh-Schwabe representative to obtain all necessary information. The installation manual provides information on wiring and contains all ordering details for external products that were tested.

8 Annex

Clicking on the "Go2Rem" button will switch the iCTI to a different mode.

After the transfer process, the previously shown image will reappear and you will be able to select a storage location to which you want to save the respective parameters. If you select one of the program storage locations M1 to M4, the parameter setting GUI will appear with the following reduced function scope:
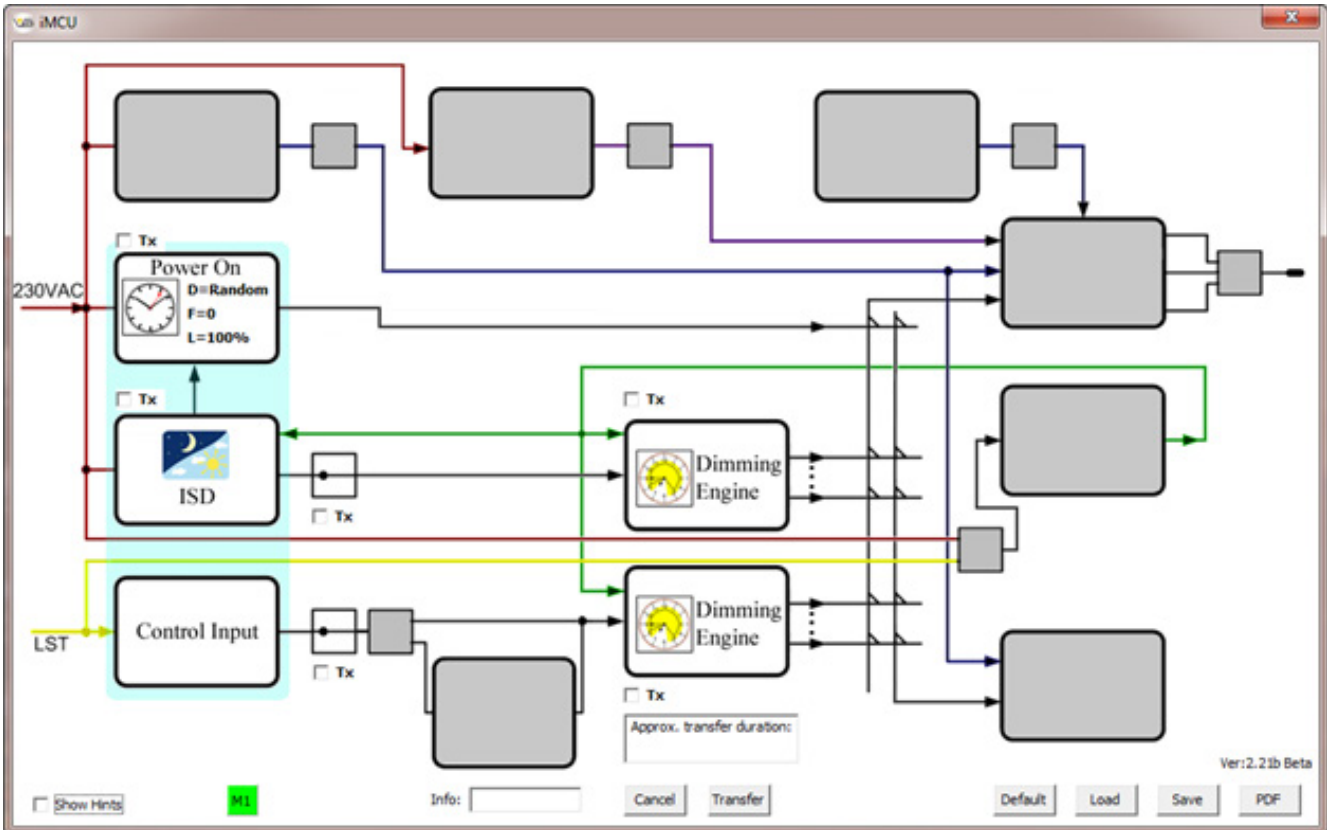
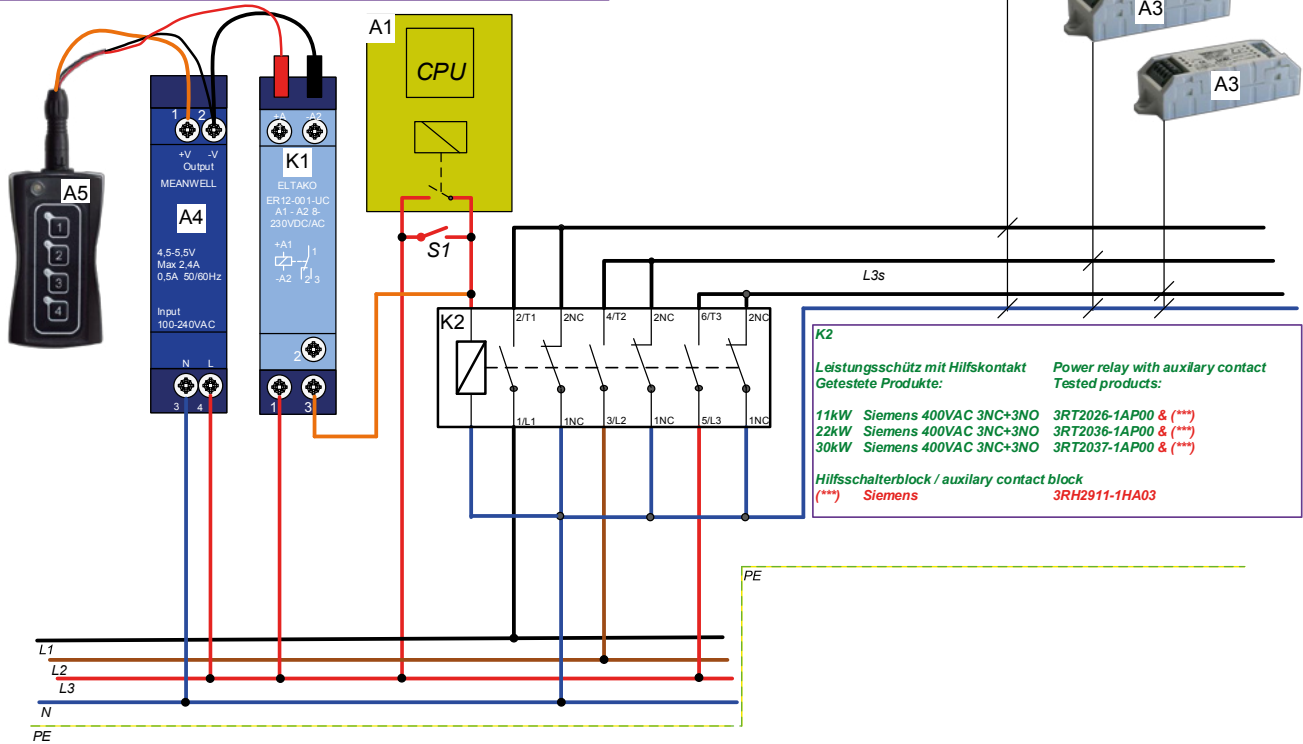With the exception of the Tx checkbox, the GUIs are identical. Only if you click on Tx will the assigned function/function block be transferred. The window above "Cancel" and "Transfer" will display the estimated duration of the data transfer for the switching commands.
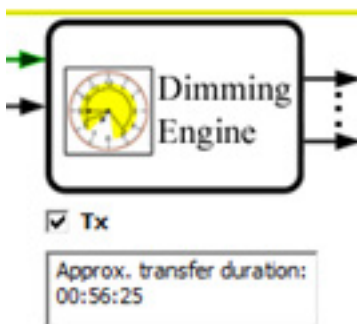
As the process can take up to 1 hour depending on the volume of parameters, only strictly necessary items should be selected for the data transfer.

8.3 iCTI Remote Layout for Installation in a Distribution Cabinet

Schaltplan für (11,20, 30)kW max Power	Schematic for Max Power 2kW
A1 TFR,EFR ... Empfänger, Lichtsensor	Standard control unit
K1 Hilfsrelais ELTAKO ER12-001-UC	Auxilary relay ELTAKO ER12-001-UC
A3 iMCU intell. Multifunctionl Control Unit	iMCU intell. Multifunctionl Control Unit
A4 Hutschienen Netzteil	DIN-Rail Trafo
MeanWell HDR-15-5 oder alternativ	MeanWell HDR-15-5 or alternativ
A5 iCTI Handprogramiergerät	Hand programing unit
/!\ nur mit entsprechender Firmware	only with the right firmware
S1 Handbedienebene	Manual switch

CPU (A1)

A5

A4 — MEANWELL
+V -V Output
1 2
4,5-5,5V
Max 2.4A
0,5A 50/60Hz
Input
100-240VAC
N L
3 4

K1 — ELTAKO
ER12-001-UC
A1 - A2 8-230VDC/AC
+A1
-A2
1 3

S1

K2
2/T1 2NC 4/T2 2NC 6/T3 2NC
1/L1 1NC 3/L2 1NC 5/L3 1NC

L3s

A3
A3
A3

K2	
Leistungsschütz mit Hilfskontakt	Power relay with auxilary contact
Getestete Produkte:	Tested products:
11kW Siemens 400VAC 3NC+3NO	3RT2026-1AP00 & (***)
22kW Siemens 400VAC 3NC+3NO	3RT2036-1AP00 & (***)
30kW Siemens 400VAC 3NC+3NO	3RT2037-1AP00 & (***)
Hilfsschalterblock / auxilary contact block	
(***) Siemens	3RH2911-1HA03

PE

L1
L2
L3
N
PE

Whenever a luminaire goes on around the world, Vossloh-Schwabe is likely to have made a decisive contribution to ensuring everything works perfectly.

Headquartered in Germany, Vossloh-Schwabe counts as a technology leader in the lighting sector. The quality and efficiency of our products are the reason for this success.

The product portfolio covers the entire range of lighting components for LED systems with perfectly matching control gear and highly efficient optical systems, modern control systems (LiCS) as well as electronic and magnetic ballasts, and lampholders.

The future of the company is geared towards smart lighting.

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