

Operating Manual

DEHNrecord DRC MCM XT



Issued by: DEHN + SÖHNE GmbH + Co.KG.
BA 1669 / V 1.006 – Update 03/10 / Id.-No. 056286

Index:

1.	Terms and definitions	3
2.	Literature / References	4
3.	Application	5
4.	LifeCheck®.....	5
5.	Equipment specifications	6
6.	Design/Arrangement	11
6.1	Single application	11
6.2	Multiple application.....	12
7.	Connections	13
7.1	Power supply.....	13
7.2	Remote signalling contacts	13
7.3	RS485 Bus interface	14
8.	Configuration	15
8.1	Number of protective devices to be monitored	15
8.2	Bus address/Group No.....	15
8.3	Interface termination impedance.....	16
9.	Programming the protective devices	18
9.1	Online programming by PC and DRC MCM XT monitoring device.....	18
9.2	Offline programming by hand-held reader DRC LC M3+	21
10.	Starting operation of DRC MCM XT.....	24
11.	Monitoring status.....	26
12.	“Replace SPD” monitoring status – Service measures	27
12.1	On site determination via show button	27
12.2	Offline determination via DRC LC M3/M3+ hand-held reading device	28
12.3	Online determination via Status Display + Service Console PC software.....	31
13.	Functional extensions for the DRC MCM XT	33
13.1	Extension of functional scope in the "show" display mode	33
13.1.1	Programming of SPDs with LifeCheck	33
13.1.2	Acknowledgement of the remote signalling contact.....	35
13.2	Stopping a running test procedure	36
13.3	Testing for the existence of non-configured Blitzductors.....	36
14.	Technical data.....	37
15.	Projection/Notes on application	39
16.	Warnings	42
17.	Maintenance and care	43
17.1	Software update	43
17.2	Cleaning	44
17.3	Transport and storage.....	44
18.	Problems / Possible solutions.....	45
18.1	Service mode.....	48

Note:

The information provided in the present document may be modified without advance notice. DEHN + SÖHNE GmbH + Co.KG cannot be held liable for any changes made.

1. Terms and definitions

Blitzductor[®]

Surge protection module manufactured by DEHN + SÖHNE

DEHNrecord DRC LC M3+

DEHNrecord DRC LC M3+ is a compact hand-held reading device with integrated RFID technology for non-contact testing of surge protection modules (*Blitzductors[®]*).

DEHNrecord DRC MCM XT

DEHNrecord DRC MCM XT is a compact monitoring device with integrated RFID technology for stationary testing of surge protection modules (*Blitzductors[®]*).

HW

Hardware

SW

Software

LifeCheck[®]

Test for correct functioning which allows to check surge protection modules during operation of the installation without removing them.

RFID

Radio Frequency Identification – Identification procedure by radio technology which allows for non-contact reading and saving of data.

SPD

Surge Protective Device (surge protection module)

RS485

Differential serial data interface

BA

Individual Bus Address of every user (device) at the serial RS-485 data connection (Bus).

Remote signalling contact

Floating remote signalling contact; make contact 13, 14 (no), break contact 21, 22 (nc)

USB

Universal Serial Bus – Bus system for connecting external devices

2. Literature / References

- /1/** Operating manual ***DEHNrecord DRC LC M3+***
 Issued by DEHN + SÖHNE
- /2/** Operating manual ***DEHNrecord DRC Software Update***
 Issued by DEHN + SÖHNE
- /4/** Operating manual ***PC Software Status Display + Service Console***
 Issued by DEHN + SÖHNE

3. Application

DEHNrecord DRC MCM XT is a compact monitoring device in an *XT* enclosure with integrated RFID technology for non-contact stationary monitoring of surge protection modules (SPDs).

These SPDs and the monitoring device are marked with the *LifeCheck*[®] symbol.

LifeCheck[®] symbol



Up to 10 surge protection modules (type *Blitzductor*[®] with integrated *LifeCheck*[®] function) can be assigned to one *DRC MCM XT* device for monitoring.

The following surge protection modules are supplied with *LifeCheck*[®] technology:

- *Blitzductor*[®] CT; Types *BCT MLC* ...
- *Blitzductor*[®] XT; Types *BXT ML*...
- *Blitzductor*[®] XT; Types *BXT...EX*...

The *DEHNrecord DRC MCM XT* monitoring device performs a permanent and non-contact checking of this “group” of protection modules, showing the result by an integrated LED indicator and providing remote signalling via the floating switch contacts. Both the LED indicator and the remote signalling contact display the total information about the operating state of all protection modules assigned to the monitoring device:

- All protection modules of the group are alright
- Replacing of at least one protection module is required

A detailed fault diagnosis can be obtained by

- the LED after applying the button or
- the RS485 interface of the device or
- manual testing of the individual SPDs with *DEHNrecord DRC LC M3+* reading device

4. LifeCheck[®]

Protection modules with *LifeCheck*[®] symbol are equipped with an RFID-based combined transmission and monitoring unit. Thermal and electrical overloads of the surge protective device will be detected reliably.

With *DEHNrecord DRC MCM XT* stationary monitoring device, the operating state of these surge protection modules (type *Blitzductor*[®]) can be monitored permanently and reported by remote signalling to a superordinated control centre.

5. Equipment specifications

DEHNrecord DRC MCM XT stationary monitoring device consists of

- a special base part for DIN rail mounting and wiring
- a *BXT* plug-in module including the condition monitoring unit



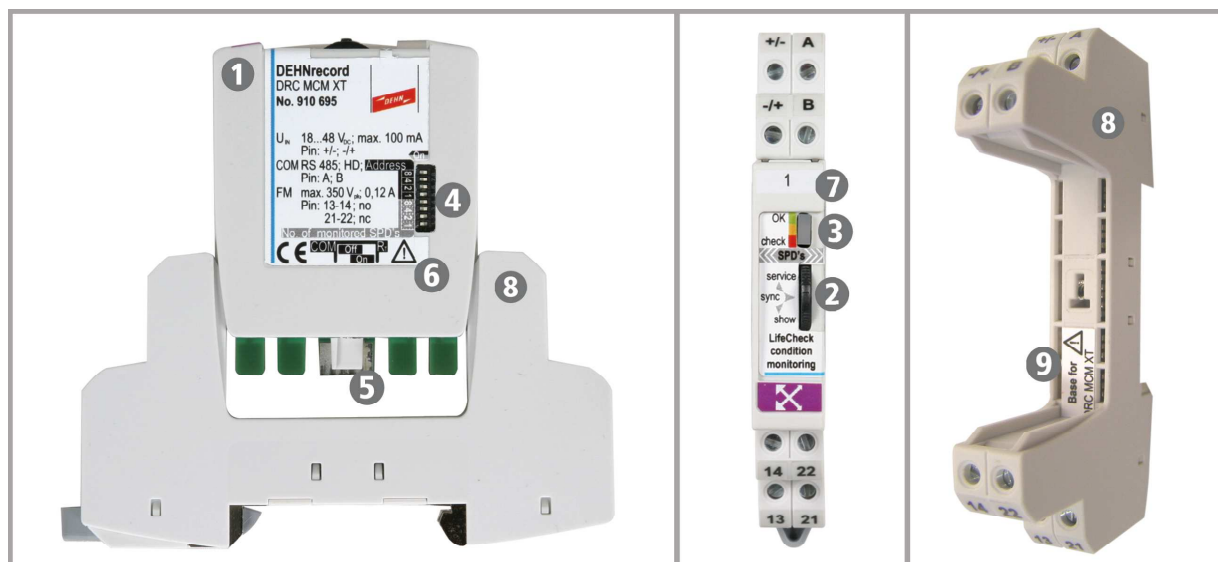
Apart from a **quick guide**¹⁾, delivery includes the **BS BA1 BA15 BXT labelling system**.

The current version of

- detailed instructions for use concerning *DRC MCM XT* (Publication No. 1669)
- the *DRC MCM XT* device software
- an installation packet for the PC software *Status Display + Service Console* for visualising and accessing the device via RS485 interface including operating manual /3/
- an installation packet for the *Software DRC SW Update* PC software for updating the *DRC LC M3+* reader and *DRC MCM XT* monitoring device via interface including operating manual /2/
- an operating manual for hand-held reader *DRC LC M3+* /1/
- a device software for hand-held reader *DRC LC M3+* /1/

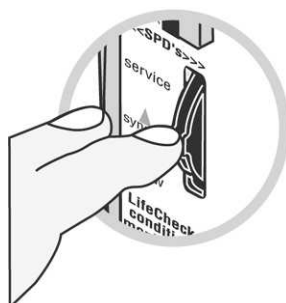
can be downloaded from **www.dehn.de/download/** or can be ordered as CD-ROM version for a nominal fee.

1) Publication No. 1666, see also www.dehn.de



- 1 *DRC MCM XT* plug-in module for plugging/snapping into the base part 8 ; Monitoring device for stationary permanent *LifeCheck*[®] of up to 10 *BLITZDUCTOR*[®] XT (or CT) modules.

- 2 3-way button for controlling *DRC MCM XT* with the following functions:






- service** activates and/or deactivates the Service mode (extended interface functions)
- sync** changes from Slave mode to Master mode and back again, i.e. it starts and/or stops the monitoring process, which also includes the synchronisation of several devices connected with each other via the bus
- show** starts and/or cycles the detailed LED operating state indication

The button is to be operated by pressing (**sync**) or by switching it without pressure up (**service**) or down (**show**).


The button has to be applied for min. 2 seconds or until the corresponding function can be read from the LED indication.

During the test procedure (LED, permanent orange light) no application of the button will be accepted. Checking (LED, permanent orange light) can be interrupted by any button actuation, see also "Added/new functions for the DRC MCM XT" in chapter 13.

- 3 Indicator element (**3-colour LED**)  for indicating the monitoring and device status. The blinking LED indicates the operating state. Irrespective of the colour,

- fast blinking  stands for device in Master mode
- slow blinking  stands for device in Slave mode

Device status, irrespective of the blinking frequency, means


-  Starting sequence: - Master is checking for other master at the bus
- Slave is waiting for synchronisation by master.


 Service mode: Access to service information via bus

 Device status, failure/ wrong configuration (DIP switch)

Monitoring status, irrespective of the blinking frequency,

 means that all monitored protective devices are alright

 means that at least 1 of the monitored SPDs has to be replaced

 means that status "Replace SPD" was acknowledged for remote signalling contact.

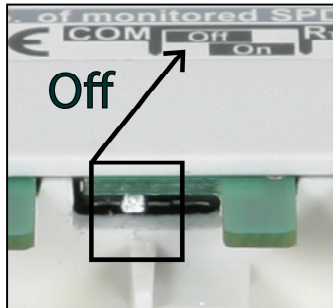
- 4 8-way DIP switch for configuring the monitoring device, divided in 2 functional groups;

Function				
Specifies the number (n) of the protective devices to be monitored. The numbers 1...n will also be used as a current number for parameterising the protective to be monitored.	Delivery status	0		
	Permissible range	1 ... 10		
	Setting	Binary setting by switching on the corresponding valance : e. g. 10		
		8	4	2
	On	Off	On	Off
Specifies the bus address of the interface (COM) or group No. of the monitoring device. This will also be required for parameterising the protective device to be monitored.	Delivery status	0		
	Permissible range	1 ... 15		
	Setting	Binary setting by switching on the corresponding valance : e. g. 5		
		8	4	2
	Off	On	Off	On

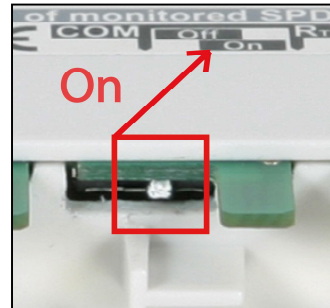
Settings may only be performed after removing the plug-in unit.

- 5 Slider switch/jumper for activating (On) and/or deactivating (Off) the 120 Ω termination impedance (R_T) at the connections (A and B) of the serial 2-wire RS485 interface (COM) during half-duplex operation (HD).

Configuration by slider switch:

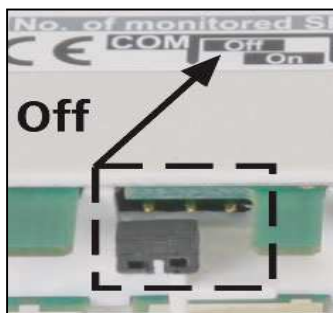


R_T deactivated

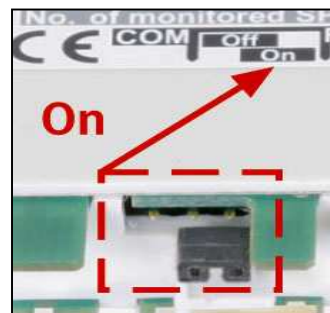


R_T activated (as-delivered state)

Configuration by jumper:



R_T deactivated



R_T activated (as-delivered state)

Switching/jumping may only be done after removing the plug-in unit.

- 6 Warning, observe installation instructions!
- 7 Adhesive label of the labelling system included in delivery, for marking *DRC MCM XT* with the bus address (BA1...BA15) set at the DIP switch. This bus address or group No. is required for programming the protective devices for stationary monitoring and/or for localising faulty protective devices and providing replacement devices.

- 8** Special base part for DIN rail mounting with terminal screws, for supporting the plug-in module **1**.

Screw	Function	Remark	
+ / - - / +	External d.c. power supply, 18...48 V, max. 100 mA	any polarity	
A B			
	Serial RS485 interface in half-duplex operation	+ data	for synchronising several devices
		- data	
13 14	Remote signalling contact 1, make contact, no	Max.: 300 mW for; d.c. 350 V; 120 mA a.c. 250 V; 70 mA any polarity	
21 22			

- 9** Warning: Base part designed for *DRC MCM XT* plug-in module only; observe the installation instructions!

6. Design/Arrangement

With *DRC MCM XT* monitoring device, 1 to 10 *BLITZDUCTOR® XT* or *CT* modules with *LifeCheck®* function can be permanently monitored.

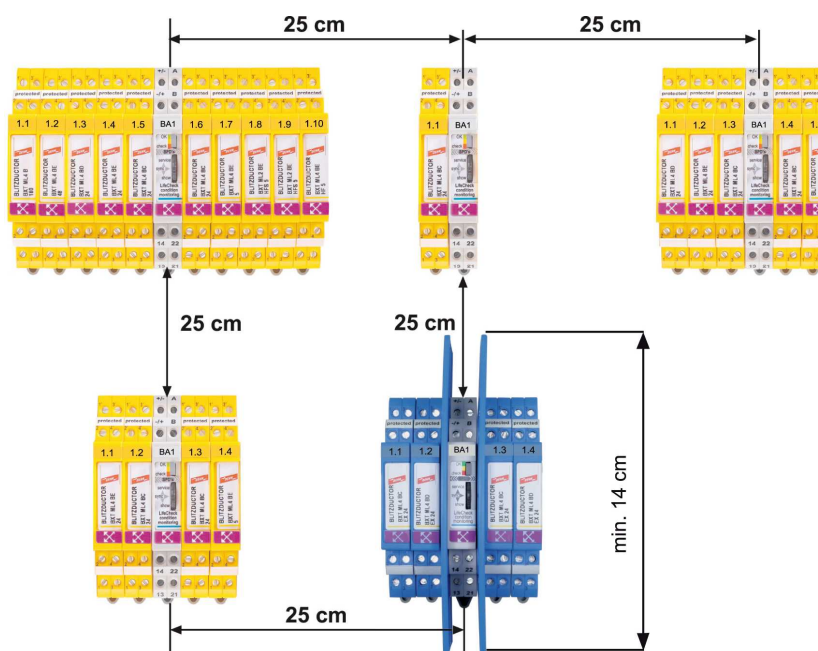
Monitoring of BXT...EX...urgently requires the installation of separators TW DRC MCM EX in order to have a separation distance between intrinsically safe and not intrinsically safe circuits! The separator requires a space of min 14 cm (e.g. distance to cable ducts at least 14 cm and DIN rail in centred arrangement to the cable ducts).

The protective devices should be assigned to the monitoring devices as equally as possible. The *DRC MCM XT* device, however, has to be arranged as centrally as possible between the assigned SPDs. Reserve slots shall be positioned on the outer sides. In case of a mixed monitoring of *BLITZDUCTOR® XT* and *CT* modules, they have to be arranged according type and each type on one side.

Potential sources of interference, e.g. switched-mode power supplies having a pulse frequency similar to the RFID operational frequency, should be installed in the minimum distance specified.

6.1 Single application

A minimum distance of 25 cm (radius) between the *DRC MCM XT* devices has to be kept in order to exclude mutual interference and thus incorrect measurements.



Apart from the number of protective devices to be monitored, also the bus address/group No. (any No., 1 ... 15) has to be set at each *DRC MCM XT* device.

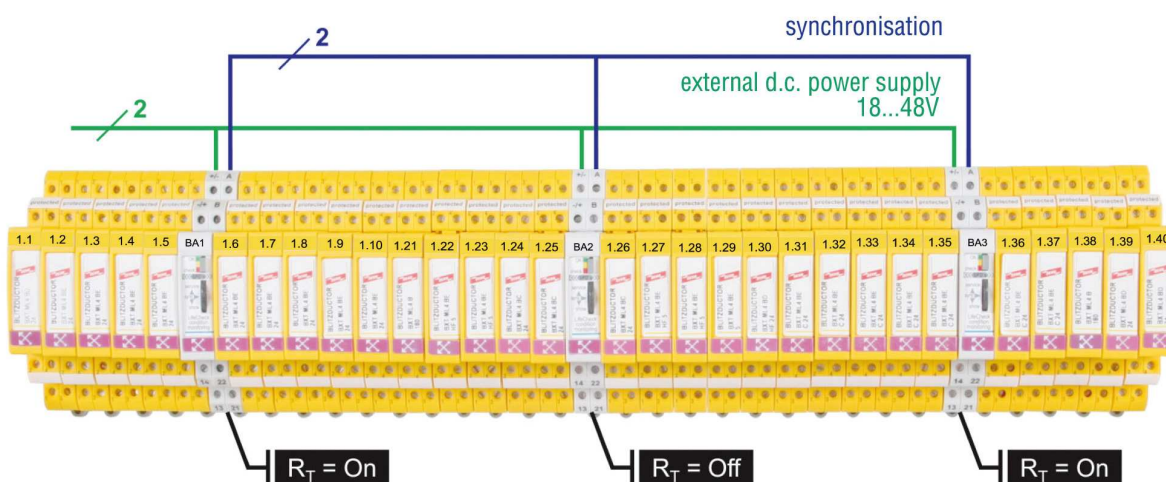
Assigned protective devices have to be parameterised according to the bus address set.

Apart from connecting the remote signalling contacts, the *DRC MCM XT* only needs the d.c. supply voltage.

The termination impedance (R_T) at the RS-485 interface should remain active or should be activated for noise immunity.²⁾

6.2 Multiple application

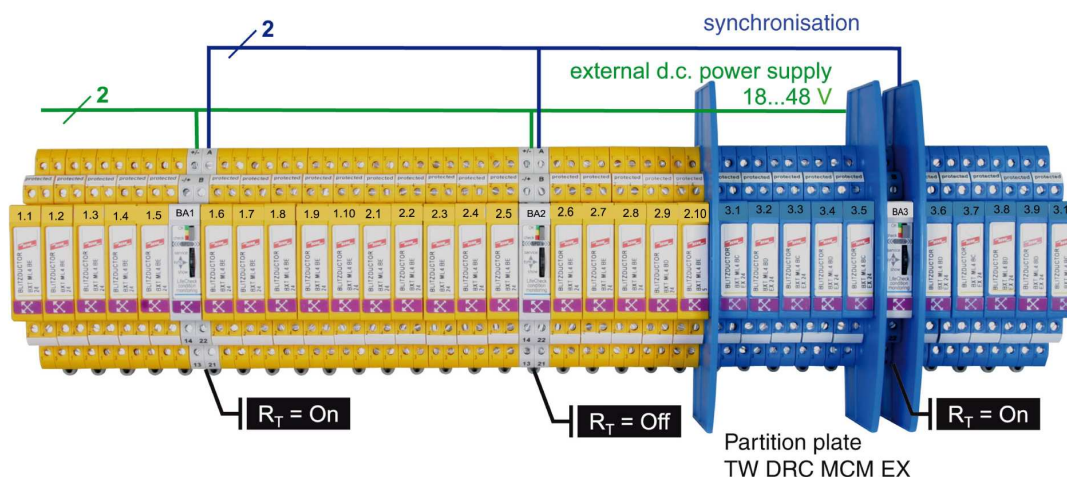
The minimum distance has not to be kept, if, apart from being connected to the external d.c. power supply, the devices are additionally connected/synchronised in parallel via interface (Pins A and B).



The individual *DRC MCM XT* devices have to be marked with different group Nos. and the protective devices have to be parameterised accordingly.

At the start and end of the bus connection, the bus termination impedances remain activated (On) per switch/jumper or have to be activated at the devices. At the devices in between, they must be deactivated (Off).²⁾

Monitoring of BXT...EX...arrester modules also here requires the application of partitions to separate intrinsically safe and not safe circuits! The space requirement of at least 14 cm (e.g. distance from cable ducts in case of centred arrangement of DIN rail) has to be minded.



2) See 8.3 Interface termination impedance

7. Connections

Installation wiring at the base and removed plug-in module.

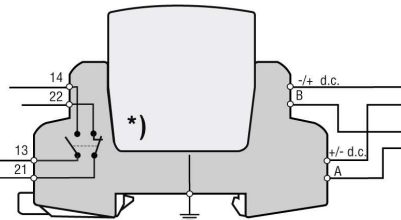
Illustration of remote signalling contacts: Functional principle! Contacts are integrated in the monitoring module!

Optional remote signalling contact

Galvanically isolated switch contacts integrated in the DRC MCM XT monitoring module.

max. 350 V d.c. / 120 mA
250 V a.c. / 70 mA

Pin: 13-14 make contact (no)
21-22 break contact (nc)



*) Illustration of the switch contacts in normal state with applied supply voltage and plugged DRC MCM XT

Voltage Supply

U_N 18...48 VDC; max. 100 mA
Pin: +/-; +/-

Serial RS-485 interface

(only in case of bus connection)

Pin A (+data)

Pin B (-data)

Recommendation: twisted two-wire cables should be used as a standard

Note:

Conductors of intrinsically safe and non-intrinsically safe circuits which are routed in same conductor bundle or cable duct, have to be isolated by means of an insulating layer or an earthed metal intermediate layer in accordance with EN 60079-14. Isolation is not required if coated or shielded conductors are used in intrinsically safe or non-intrinsically safe circuits.

7.1 Power supply

The d.c. power supply of the device has to be provided via +/- and +/- terminals.

Polarity:	optional
Nominal voltage (range):	24 (18...48) V _{d.c.}
Max. current input:	80 (100...60) mA

Smoothing and residual ripple of the power supply have to be within the nominal voltage range!

If a totally insulated power supply unit is used (☐), the termination impedance (R_T) of the RS-485 interface has to be activated (On) for single application! ²⁾

7.2 Remote signalling contacts

Remote signalling of the monitoring status of each group can be effected via electrically isolated break and make contacts integrated into the *DRC MCM XT* device. A collective signal for the complete assembly will not be generated, if several devices are synchronised.

Thus, either a linked or separate (for potential different priorities) remote signal can be sent to a superordinated control level.

Without power supply, the remote signalling contacts change to "Replace SPD" status until the next LifeCheck® is performed. The "Replace SPD" status can be quit via the extended functions of the DRC MCM XT. See also Chapter 13.

2) See 8.3 Interface termination impedance

7.3 RS485 Bus interface

The bus is connected to the device and/or between several devices via the **A** and **B** terminals.

The individual devices have then to be connected with each other in parallel (A to A and B to B).

A twisted two-wire line is generally recommended as bus connection. A shielded type should be used for cables longer than 3 m and for lengths up to 1.2 km, both the surge impedance of 120 Ω and a conductor cross-section of $>0.5 \text{ mm}^2$ has to be considered. Conductors crossing between buildings also require a separate surge protection.

The state of the termination impedance (R_T activated or deactivated) has to be observed! ²⁾

2) See 8.3 Interface termination impedance

8. Configuration

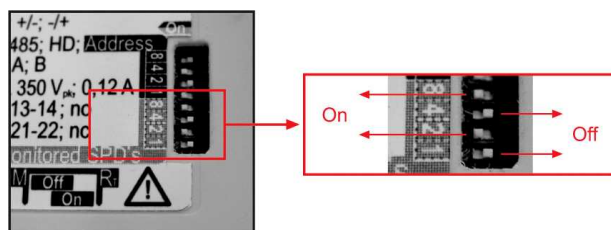
Settings/Modifications of the device configuration can/must only be implemented at the removed plug-in unit.

When delivered, all DIP switches are set to OFF. When starting operation, this causes a fault indication (inadmissible configuration).

8.1 Number of protective devices to be monitored

The number of protective devices to be monitored by the device has to be set via 4 DIP switches on the side. Settings to 0 or > 10 lead to a fault indication via LED when starting operation.

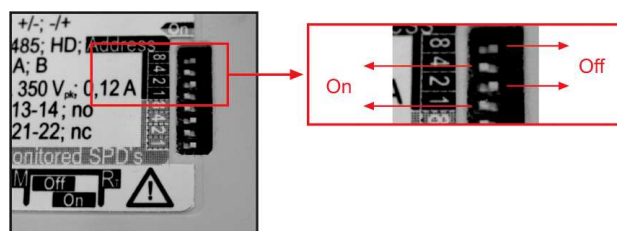
DIP switch					
Delivery status		0			
Permissible range		1 ... 10			
Settings		Binary settings by switching on the corresponding valance : e. g. 10			
		8	4	2	1
		On	Off	On	Off



8.2 Bus address/Group No.

The bus address of the serial RS485 interface integrated into the device, which is also set by 4 DIP switches on the side, will be used at the same time as a group No. for the protective devices assigned. If 0 is set, a fault is indicated via LED when starting operation.

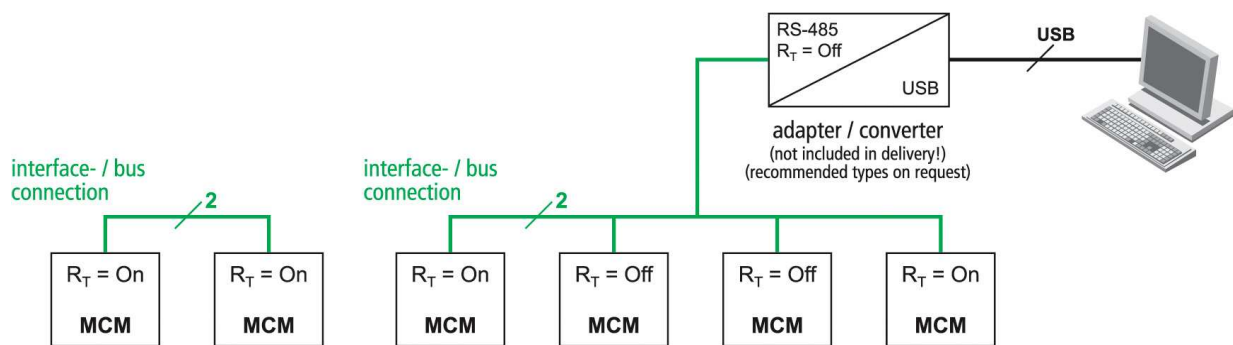
DIP switch				
Delivery status	0			
Permissible range	1 ... 15			
Settings	Binary settings by switching on the corresponding valance : e. g. 5			
	8	4	2	1
	Off	On	Off	On



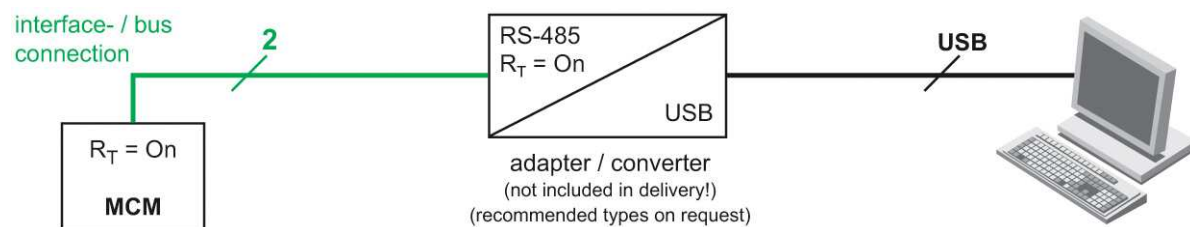
For synchronising several devices, these have to be configured with different bus addresses, which have to correspond to the programming of the SPDs assigned.

8.3 Interface termination impedance

The device has a serial RS485 interface for half-duplex operation (HD, 2-wire connection). In order to ensure a safe data transmission on this differential bus, it is necessary to activate a $120\ \Omega$ termination impedance (R_T) at each of the both terminal points of the bus system within the devices.

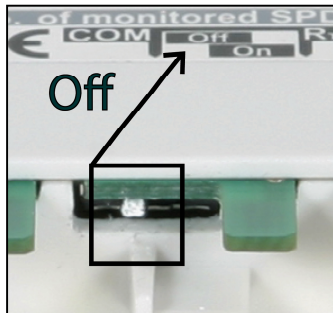


It is advisable to activate the termination impedance of *DRC MCM XT* even for a single application due to interference immunity (e.g. if a totally insulated power supply unit is used) and to ensure that the module does not have to be removed in case of extension or access by PC for maintenance purposes and/or to ensure that there are no transmission problems.

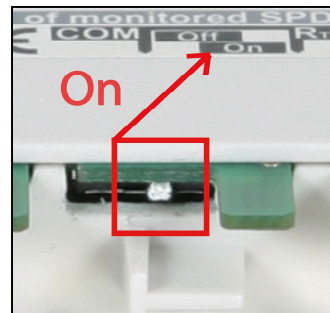


The termination impedance (R_T) can be activated and/or deactivated on the bottom side of the plug-in module after removing it by positioning the slider switch/jumper. The corresponding position can also be taken from the rating plate. The position can usually be set by means of tweezers. In as-delivered state, the termination impedance is activated.

Configuration by slider switch:

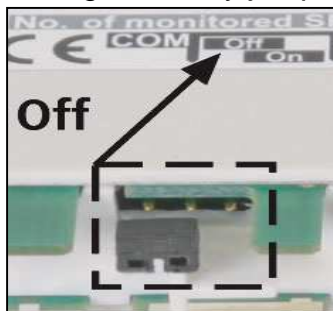


R_T deactivated

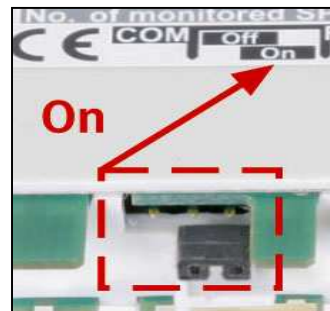


R_T activated

Configuration by jumper:



R_T deactivated



R_T activated

9. Programming the protective devices

In as-delivered state, *Blitzductors*® XT and CT cannot be used with a *DRC MCM XT* at the same time yet. The protective devices can be assigned to the respective *DRC MCM XT* monitoring device only by correspondingly programming of the RFID transponders which are integrated into the protective devices.

When programming the protective devices, a definite password for each transponder is generated and stored in the transponder, containing the bus address/group No. of the assigned monitoring device as well as current number of the respective *Blitzductor*® within the group.

During operation, the transponder then reacts only upon enquiries containing its password.

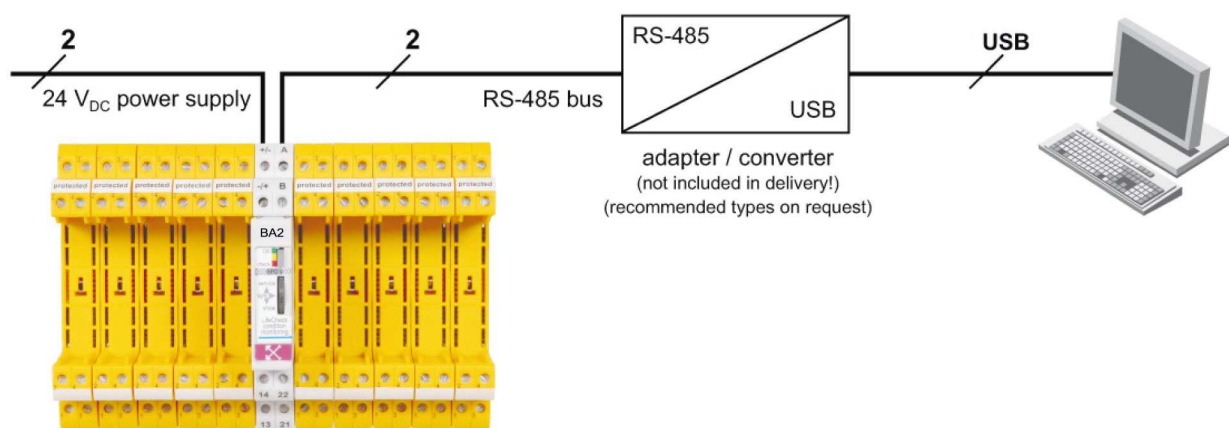
There are three possibilities for programming the devices:

- Online programming via PC and *DRC MCM XT* monitoring device
- Offline programming via *DRC LC M3+* reading device
- Direct programming at the *DRC MCM XT* monitoring device (see extended functions in Chapter 13)

9.1 Online programming by PC and *DRC MCM XT* monitoring device

Conditions:

A PC with connected and installed USB/RS485 converter is connected to *DRC MCM XT* via interface (observe configuration of the termination impedances (R_T) of the bus!).²⁾



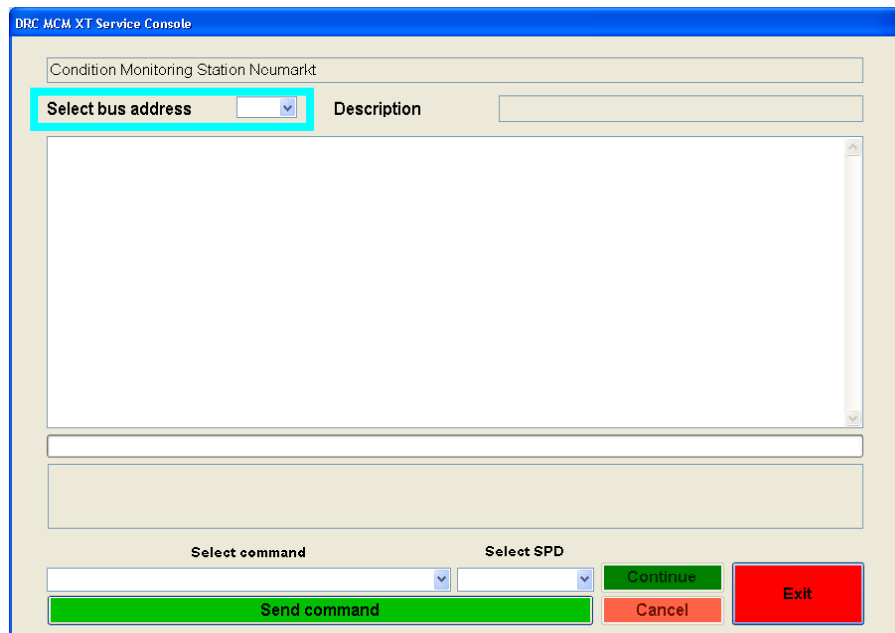
All *DRC MCM XT* devices connected to the bus are set to slave mode (slow blinking).

The *DRC MCM XT* device to be used for programming, has to be set to service mode to ensure that it can be addressed by the software³⁾.


Unprogrammed SPDs must not be within the range of *DRC MCM XT*. The figure shows the initial situation for installation.

²⁾ See 8.3 Interface termination impedance

On the PC the service function *Service Console* is started in the *Status Display + Service Console* software and the **bus address** corresponding to the *DRC MCM XT* device is set.³⁾



Important:

- Make sure that only 1 unprogrammed SPD is situated within the range (25 cm) of the *DRC MCM XT* device to be used for programming!
- Program the respective SPD only at its final plug-in position!
- **Do not click in** the SPD to be programmed but plug it in only to the first mech. resistance!
- Label the programmed SPDs immediately! By using only their current numbers (1, 2, ..., 9, 10) or, even better, by using them in connection with the group No. of the *DRC MCM XT* device (if the group No. is BA 3, for example, then use 3.1, ... 3.9, 3.10)! And/or note down the individual passwords in the documentation!
- **Click in** the programmed SPDs completely! 
- The command "program all SPDs of a DRC MCM XT" allows the user to carry out the programming procedure shown in the following step by step. Instruction for further proceeding will be displayed.³⁾

³⁾ See also operating manual for Status Display + Service Console /3/.

Procedure:

Items 1–4 have to be performed one after another and for each individual SPD to be programmed!

1. Insert the SPD to be programmed into its plug-in position, but **do not click it in!**

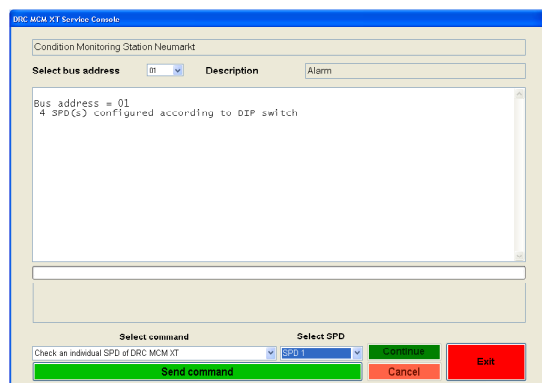


For installation, proceed from the left to the right



For service purposes, proceed directly at the plug-in position.

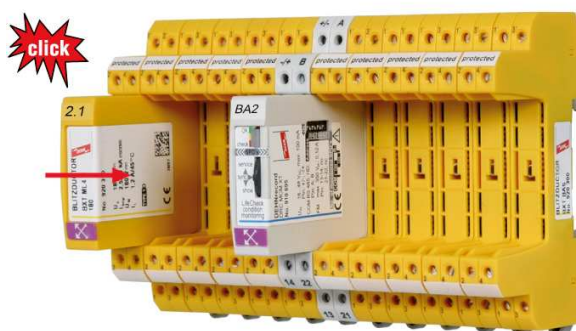
2. In the service function *Service Console*, select the “Program individual SPD for DRC MCM XT” command and enter the corresponding current SPD No..
Select command (#1), then the SPD No. (#2) and Send command (#3).
The programming result will be indicated by the result display of the *Service Console*.³⁾
If the programming fails repeatedly, the status of the SPD has to be checked with DRC LC M3+ reading device.



3. Label the successfully programmed SPD.



4. **Click in** the SPD completely.



3) See also operating manual for Status Display + Service Console software /3/.

If all SPDs have been programmed successfully, a test of all SPDs assigned to a selected MCM can and should be initiated by means of the *Service Console* and the "Check all SPDs of the DRC MCM XT" command in order to obtain the indication "All SPDs OK" to verify the test result.


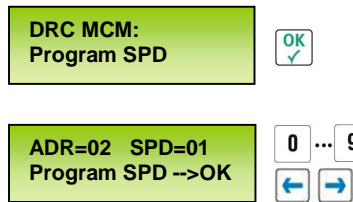
During the test even correctly programmed SPDs will be identified as faulty, if there are one or several unprogrammed SPDs.

If an SPD was programmed in a wrong way, it has to be reset with the *Service Console* and the command "Reset individual SPD to as-delivered status" before it can be programmed again. Also in this case, the SPD must **not be clicked in completely** and the password has to be known (if required, it has to be determined via the "Search SPD" command)!

To complete the programming procedure,

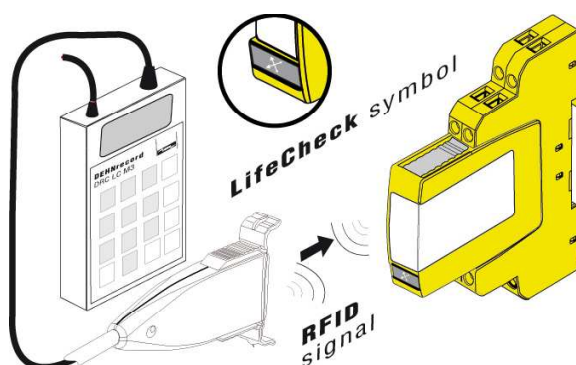
- close the service console ("Close")
- quit the service mode of all *DRC MCM XT* devices connected to the bus (**service** button) and set **one** *DRC MCM XT* device in the master mode (**sync** button)
- remove the bus connection to the PC

9.2 Offline programming by hand-held reader DRC LC M3+

Description Offline programming via DRC LC M3+ - Part 1	Display on reader
<p>Programming of SPDs for stationary monitoring without PC by <i>DRC LC M3+</i>. Minimum requirement DRC LC M3 version 1.1.02. Update of device software by means of PC software DRC SW Update. Device software available under www.dehn.de/download/. More details about the device update in our operating manual. ¹²⁾</p>	
<p>Programming of SPDs and all other functions for the protective devices regarding the <i>DRC MCM XT</i> are summarised in the <i>DRC LC M3+</i> under the <i>DRC MCM</i> menu item:</p> <p>Selection of submenu for programming of SPDs</p>	
<p>Programming will be effected in the "Programme SPD" submenu item. After confirmation please enter the MCM bus address and the sequential number of the Blitzductor to be programmed. Switching from bus address entering to SPD number by means of the blue arrow keys.</p>	

4) See Operating Manual DRC LC M3+. ¹¹⁾

The protection modules can be programmed individually after removing them,



















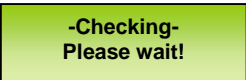


or if they are already plugged in.



Note: During the programming operation no other unprogrammed SPD must be around the LifeCheck sensor within a circle of 25 cm!

Please mind that the stationary reading device *DRC MCM XT* is inactive, i.e. its module has been removed or the supply voltage has been interrupted or *DRC MCM XT* was set to slave mode (slow blinking).

Description Offline programming via <i>DRC LC M3+</i> - Part 2	Display reading device
Start programming only after the <i>DRC LC M3+</i> sensor having been snapped on to the SPD to be programmed.	<div data-bbox="1023 1585 1270 1664" style="border: 1px solid black; padding: 5px;"> ADR=02 SPD=01: Program SPD--> OK </div> <div data-bbox="1289 1603 1331 1644" style="border: 1px solid black; padding: 2px; display: inline-block;">OK ✓</div>
During the programming operation, the sensor must not be removed from the SPD.	<div data-bbox="1023 1720 1270 1798" style="border: 1px solid black; padding: 5px; background-color: #d4edda;"> -Programming- Please wait! </div>

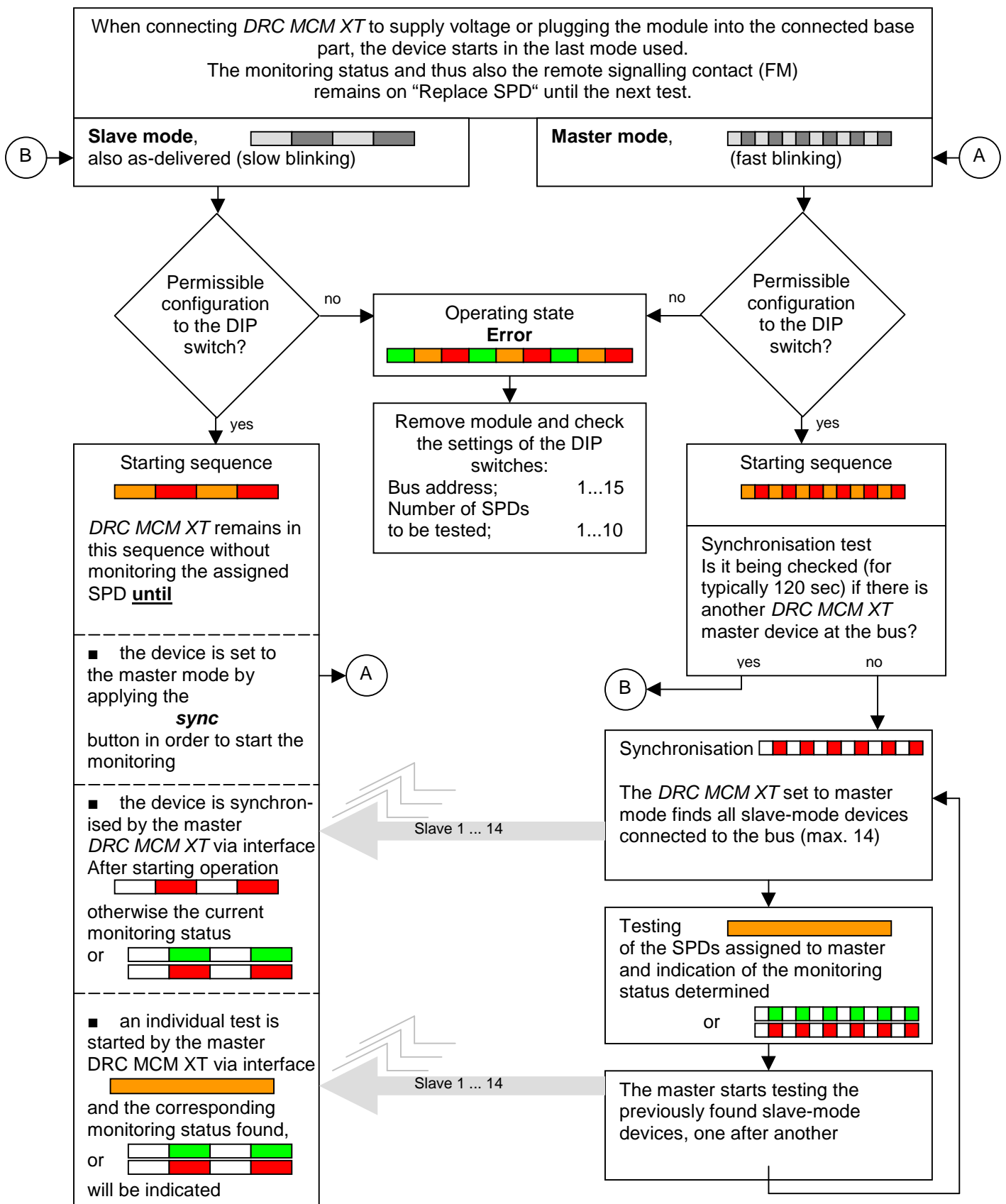
Description Offline programming via <i>DRC LC M3+ - Part 3</i>	Display reading device
<p>The LifeCheck test result will be displayed as LifeCheck OK or Replace SPD ⁴⁾.</p> <p>If the programming fails repeatedly, the operating state of the SPD has to be checked with <i>DRC LC M3+</i> reading device ⁵⁾.</p>	 
<p>Confirming the result leads automatically to the next current No. within the group. This ensures an efficient procedure, resp. a No. can be entered by the numerical keys. (Switching from bus address to SPD by means of the blue arrow keys!)</p>	 
<p>Label programmed SPDs immediately with the No. (1, 2, ..., 9, 10) or, even better, with the group No. / bus address (BA) of <i>DRC MCM XT</i> (if the group No. is BA 3, for example, use 3.1, ...,3.9, 3.10)!</p>	
<p>The programming can be checked by testing the protective devices in the submenu "Check/Search".</p> <p>Enter bus address and number of monitored SPDs.</p> <p>Selection submenu "Check SPD"  </p> <p>Selection of the SPD No. to be tested  </p> <p>Snap on LifeCheck sensor on SPD and start checking</p>	       
<p>While checking the sensor must not be removed from the SPD!</p>	
<p>The LifeCheck test result will be displayed as LifeCheck OK or Replace SPD ⁴⁾.</p> <p>If the programming fails repeatedly, the operating state of the SPD has to be checked with <i>DRC LC M3+</i> reading device ⁵⁾.</p>	 
<p>If all SPDs were programmed successfully, operation of stationary <i>DRC MCM XT</i> monitoring device can be started.</p>	

Note: Kindly observe the deviating functional scope and programming operation with the hand-held reader *DRC LC M3*, operating manual BA 1670/V.1.1.0.1 "Extension for the Stationary Monitoring Device *DRC MCM XT*"!

4) Please also refer to the *Operating Manual for DRC LC M3+ /1/*

5) See 18. Problems / Possible solutions

10. Starting operation of DRC MCM XT


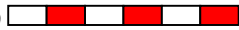


As-delivered, the devices start in the slave mode, i.e. they are inactive and react only upon applying a button or a command by bus.



Monitoring of the protective devices by *DRC MCM XT* is started by setting the *DRC MCM XT* to the master mode if it used as an individual device.


If several *DRC MCM XT* devices are synchronised via the bus connection, only one of these devices has to/may be set to master mode. This co-ordinates/starts the testing of the SPDs of the connected slave-mode devices.



In order to avoid malfunctions due to the presence of several master-mode devices at the bus, a synchronisation test will be performed at the beginning of the starting sequence. That means, before a master-mode device is getting active at the bus itself it listens into the bus for another already active master. The duration of this check consists of a basic duration (type 30 sec) and the variable duration, which depends on the bus address (address*10sec). If an already existing master device is detected during this test due to the bus traffic, the device is reset automatically to slave mode after a short fault indication.

Otherwise, the transition from blinking  to  when starting operation (at master or slave devices), signals the end of the starting sequence and the beginning synchronisation of the *DRC MCM XT* devices by the master. Except of devices just performing the "show" key function.

This procedure is repeated at the beginning of every monitoring cycle so that *DRC MCM XT* devices can be removed from the bus or attached to the bus any time without having to log them on or off. Only removing the master device or resetting it to slave mode will interrupt the monitoring.


Starting operation can be completed successfully if the *DRC MCM XT* device/devices indicates/indicate the monitoring status , i.e. *all SPDs alright*, after testing  the SPDs assigned.

During the first checking  after starting the *DRC MCM XT* the number of SPDs in the monitoring group set at the DIP switches will be checked up with the actually existing number of programmed SPDs:










- a) If the configured number of SPDs is lower than that of the existing SPDs, the operating status "failure"  will be displayed.
- b) If the configured number of SPDs is higher than that of the existing SPDs, the operating status "replace SPD"  will be displayed. By means of the show function it can be determined, whether one/several SPD/SPDs too much has/have been configured at the DIP switches, as the number of the not existing SPD/SPDs will also be shown by the number of red blinking impulses.

The DIP switch setting at the *DRC MCM XT* has to be checked and adjusted to the number of existing SPDs in the monitoring group.

11. Monitoring status

The monitoring status will be newly determined during every test  and then indicated by the LED and the remote signalling contacts (FM).

There are 3 possible statuses:

	LED	FM 13-14, no	FM 21-22, nc
<i>All protective devices alright</i>			
<i>Replace at least 1 protective device</i>			
<i>"Replace at least 1 protective device" was acknowledged</i>			

Each *DRC MCM XT* (even the master) determines and shows only the monitoring status of the protective devices assigned to it even if several devices are connected with each other via bus.

The updating rate of the monitoring status of a *DRC MCM XT* highly depends on the number

- of the *DRC MCM XT* devices synchronised with each other
- of the protective devices assigned to the individual *DRC MCM XT* devices
- of the protective devices to be replaced

For a single master device with 10 assigned protective devices, which are all alright, this is typically 1 minute.

For each synchronised, i.e. slave device connected to it, a further minute should be added.

In addition to that, a further 5 minutes have to be calculated for each faulty protective device. In the worst case, which, however, would not be very relevant for practice, this means that the test of 10 faulty protective devices would take approx. 50 minutes.

IMPORTANT!

Therefore, please avoid any removing of a slave-mode device during testing, as the superordinated master will start further tests only after 15 minutes in order to avoid wrong measurements!

If it is necessary to stop the checking procedure, the test sequence can be interrupted by pressing any button at the *DRC MCM XT* (no LED signal for a short time). Thus the intervention at a device does not affect the synchronised *DRC MCM XT*.⁹⁾

⁹⁾ See 13. Extended Functions

12. “Replace SPD” monitoring status – Service measures

In order to avoid installation standstills, the monitoring system of the protective devices is designed to generate the “Replace SPD” indication already in case of prospective failures due to impermissible overloads. Both thermal (overheating) and electrical (impulse currents) events will be recorded.



DRC MCM XT then records the overload or a failure of an SPD assigned to it, and gives a “Replace SPD” indication by LED and remote signalling contact. The protective device or protective devices to be replaced can be localised exactly as follows:

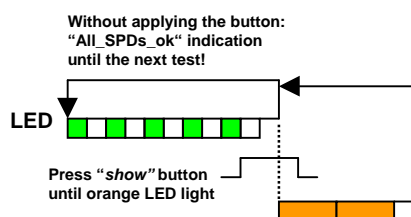
12.1 On site determination via show button

The “**show**” button can be used for indicating the faulty protective device or protective devices to be replaced on site without requiring additional tools.

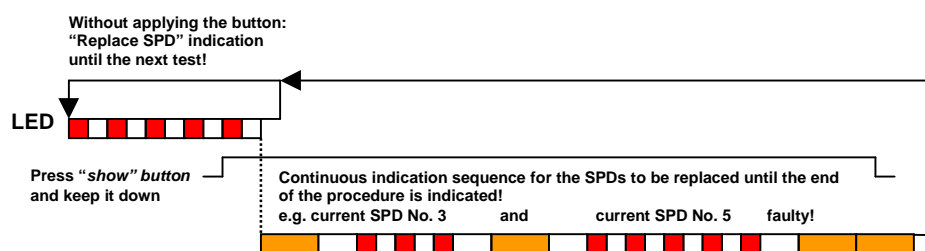
Switching the button downwards for at least 2 seconds or until the LED indicates an orange light, initiates this function.

The current numbers of the protective devices to be replaced are indicated, i.e. the respective number is shown via the corresponding number of red blinking impulses, each between an orange separator.

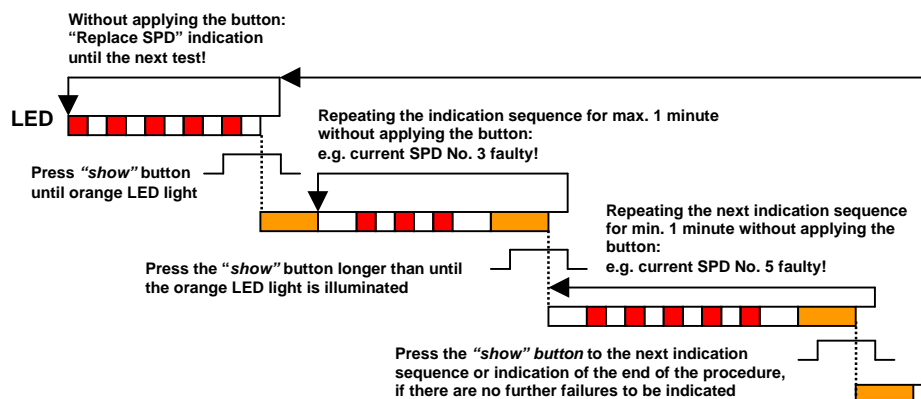
If, however, all SPDs assigned are alright, this function is directly completed without further report and by indicating the end of the procedure.



The function supports 2 types of operation. Firstly, if the button is **permanently applied**, all numbers of the devices to be replaced remain indicated for one time in ascending order.



Secondly, the indication sequence can be started by **individually applying** the **“show”** button. This means that the current number of the first SPD to be replaced is then repeatedly indicated until either the sequence is completed automatically after 1 minute or the sequence changes to the next faulty SPD No. by applying the **“show”** button again or the end of the procedure is indicated and thus completes the sequence.




With the information obtained here in connection with the marking or documentation of the passwords of the SPDs assigned, the SPD or SPDs to be replaced can be localised and exchanged correspondingly.

Testing can be interrupted  by applying any of the "show", "service", "sync" buttons until the LED stops indicating for max. 30 sec.

The "show" function can be performed independently from the operating state of the device (master or slave mode).

The monitoring should be checked until all devices give an “SPD OK” signal again.

Marking the protective devices with the current numbers (1, 2, ..., 9, 10) in connection or, even better, this number in combination with the group No. of the *DRC MCM XT* device (if the group No. is BA 3, for example, then use 3.1, ..., 3.9, 3.10) makes it easier to localise the SPDs and helps to avoid confusions among the SPDs.

It is advisable to control the monitoring until the OK status  will be indicated for all devices.

12.2 Offline determination via DRC LC M3/M3+ hand-held reading device












Checking SPDs by means of *DRC LC M3* reading device (version > 1.1.02 dated 28 May 2008) or the successor *DRC LC M3+* (version 1.2.00 dated 04 August 2009) allows to directly identify protective devices to be replaced on site without requiring a documentation or marking.

A **precondition** is that, for single applications, the reading device of the group to be tested is deactivated or, for multiple applications and if several *DRC MCM XT* devices are connected/synchronised with each other, the master device at the bus is deactivated, i.e. it is set to slave mode (slow blinking) by applying the **“sync”** button, or it is simply removed.











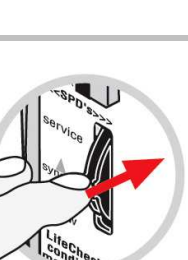
All potentially running monitoring processes must have been completed before as well.



Offline determination of SPDs to be replaced via *DRC LC M3+* hand-held reading device:

Description Offline determination via <i>DRC LC M3+</i> - Part 1	Reading device display
The testing of SPDs and all other functions for protective devices in combination with the stationary reading device are merged on <i>DRC LC M3+</i> under menu item " <i>DRC MCM</i> ". ⁴⁾	<div data-bbox="1023 853 1273 936"> Mode: < - > DRC MCM </div>
<p>Before testing, the bus address/group No. and the SPDs within the group to be worked on have to be entered first, once after switching <i>DRC LC M3+</i> on or after making modifications.</p> <p>Change between bus address and number of SPDs by  </p>	<div data-bbox="1023 969 1331 1048"> DRC MCM: Check/Search  </div> <div data-bbox="1023 1077 1390 1155"> Configuration ADR=02 SPD=10 <div data-bbox="1294 1077 1390 1155"> 0 ... 9  </div> </div> <div data-bbox="1023 1167 1374 1245"> Check SPD ADR=01 10*SPD <div data-bbox="1294 1189 1374 1234">   </div> </div>
<p>Whenever calling the configuration, the operating state of the group available under "<i>DRC MCM State</i>" will be reset to untested.</p> <p>The operating state distinguishes between 3 types - untested</p> <p style="margin-left: 40px;">1 SPD alright 0 Replace SPD</p> <p>The indication is arranged in ascending order from left to right, beginning with No. 1 to the configured quantity.</p>	<div data-bbox="1023 1283 1331 1361"> DRC MCM: State of MCM  </div> <div data-bbox="1023 1391 1331 1469"> MCM ADR=02: 1 1 0 1 1 0 - - - -  </div>
The individual protective devices are tested via <i>DRC LC M3+</i> under menu item	<div data-bbox="1023 1541 1331 1619"> Check SPD ADR=02 10*SPD  </div>
The bus address/group No. (ADR=xy) will be taken automatically from the configuration. The current number of the SPD to be tested can be selected by applying the arc keys. Both numbers form the password required for addressing the SPD.	<div data-bbox="1023 1641 1374 1731"> ADR=02 SPD=01: Check SPD ----> OK <div data-bbox="1294 1664 1374 1731">   </div> </div>

4)) See *Operating Manual DRC LC M3+ /3/*

Description	Offline determination via <i>DRC LC M3+ - Part 2</i>	Reading device display
<p>Start the testing process only as soon as the sensor of <i>DRC LC M3+</i> has been snap onto the SPD to be tested.</p>		
<p>During the test, the sensor must not be removed from the SPD.</p>	<p>-Checking- Please wait</p>	
<p>The test result will be indicated as “LifeCheck OK” or “Replace SPD” and the operating state will be updated ⁴⁾.</p>	<p>LifeCheck OK ADR=02 SPD=01</p>	
<p>The confirmation of the test result automatically leads to the next current number within the group.</p>	<p>ADR=02 SPD=02 Check SPD ----> OK</p>	 
<p>This ensures a fast procedure, as, after applying the  button, the next test can be started already after placing the antenna again. Pressing the  button will interrupt the menu.</p>		 
<p>The “State” menu item provides an overview on already performed tests: The operating state distinguishes between 3 types - untested</p>	<p>1 SPD alright 0 Replace SPD</p>	
<p>The indication is arranged in ascending order from left to right, beginning with No. 1 up to the configured quantity. Whenever calling the “Configuration” menu item, the operating state will be reset.</p>	<p>MCM Status ADR=02 10*SPD</p> <p>MCM ADR=02: 1 1 0 1 1 0 ----</p>	 
<p>Remove the localised protective devices to be replaced, verify the test result after removing them, if necessary, program⁶⁾ corresponding replacement modules and plug them in after marking them. Finally, restart the monitoring, i.e. set the device (for single applications) or a device at the bus (for multiple applications) to master mode (fast blinking) by applying the “sync” button. Check the monitoring until all devices give the “SPD OK” signal again.</p>		

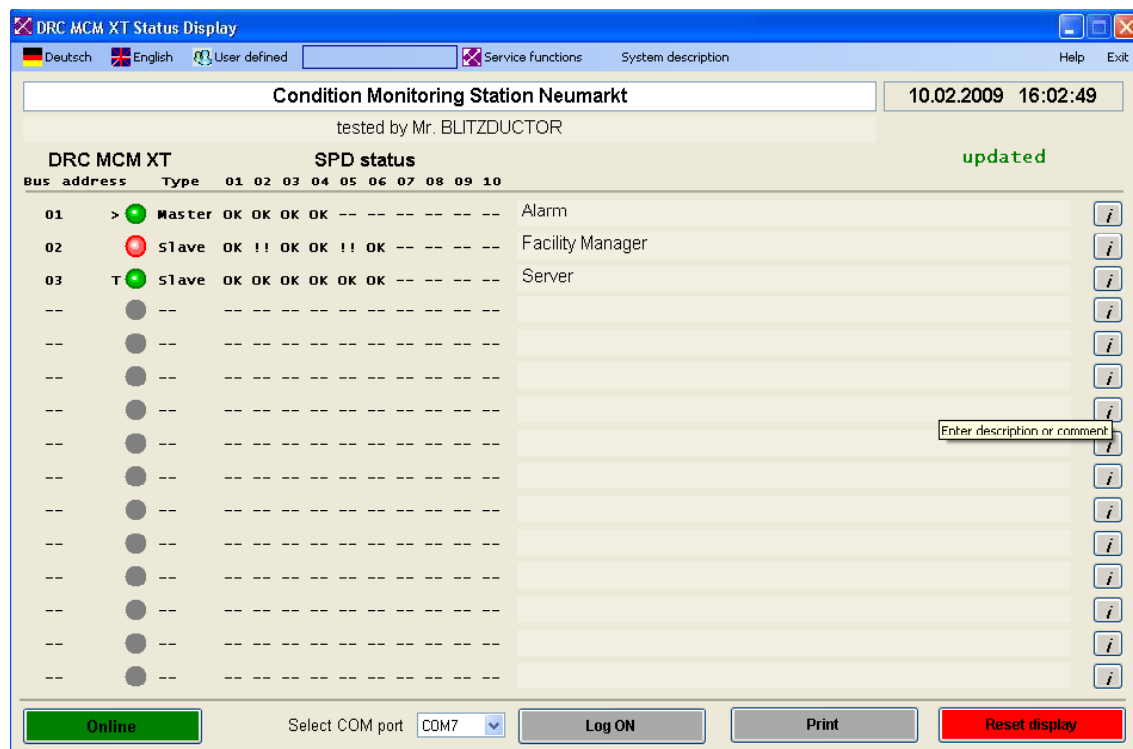
Note: Kindly observe the deviating functional scope and programming operation with the hand-held reader DRC LC M3, operating manual BA 1670/V.1.1.0.1 "Extension for the Stationary Monitoring Device DRC MCM XT"!

4) Please also refer to the *Operating Manual for DRC LC M3 Extension for Stationary Monitoring Device /1/*

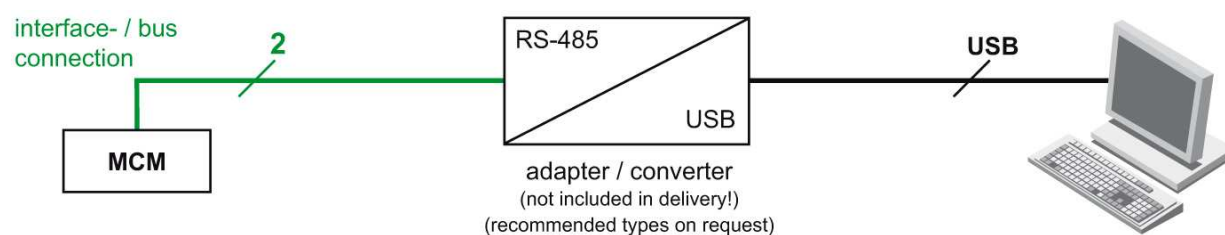
6) See 9.2 Offline Programmierung per Handlesegerät DRC LC M3/M3+

12.3 Online determination via PC software “Status Display + Service Console”

The **Status Display + Service Console** PC software ^{/3/} provides a complete overview on the operating state of the protective devices without having to interfere with their processes, especially if several *DRC MCM XT* monitoring devices are synchronised.

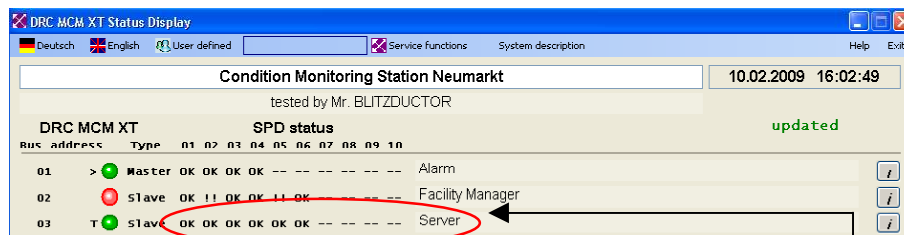


A necessary precondition is the installation of the program on the PC, which is connected to the *DRC MCM XT* devices via bus (observe configuration of the termination impedances (R_T) of the bus!). ²⁾



²⁾ See 8.3 Interface termination impedance

The program and a detailed operating manual ^{/3/} are available at www.dehn.de/download or can be ordered there on CD-ROM for a nominal charge.



function as a bus device

total operating state of this group of SPDs

● all SPDs OK

● replace one or several SPDs

● device in starting sequence (still untested)

current process

T = SPDs are being tested

> = Operating state is being updated

bus address/group No.

individual operating state

OK = SPD alright

!! = SPD overloaded/faulty
has to be replaced!

-- = SPD not configured

With this information obtained, the SPD or SPDs to be replaced can be localised and replaced in connection with the marking or documentation of the passwords of the SPDs assigned.

With the service function **“Start Service Console”** ^{/3/} replacement devices can be applied and programmed consecutively ⁷⁾.

Finally, the monitoring status should be checked again by means of the **“Status Display”** before cutting the connection between the PC and the DRC MCM XT monitoring device/monitoring devices.

7) See 9.1 Online programming by PC and DRC MCM XT monitoring device

13. Functional extensions for the DRC MCM XT

With the device software Version V1.008 dated 16 November 2009 the following described extended functions for operating the stationary monitoring device DEHNrecord DRC MCM XT are available.

13.1 Extension of functional scope in the "show" display mode

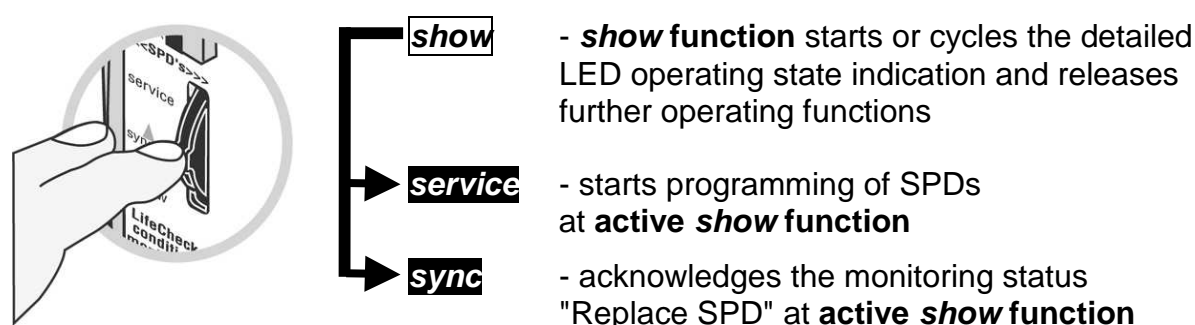
If Blitzductors (SPDs) have been identified as previously damaged by the DRC MCM XT, the "show" function allows

- to program SPDs in order to replace faulty SPDs
- to reset the remote signalling contact from the fault state by acknowledgement

while the faulty SPDs are being displayed (number of red blinking signals = No. of arrester)

The "show" function can be performed at the DRC MCM XT regardless of the device status (master or slave mode).

Extended functions in the "show" mode for controlling the DRC MCM XT by the 3-way button on the front side:



13.1.1 Programming of SPDs with LifeCheck

This function allows programming of SPDs with LifeCheck in the as-delivered state, without further tools directly in the system. Thus any other programming software e.g. "StatusDisplay with ServiceConsole" ⁷⁾ or hand-held reader DRC LC M3+ ⁶⁾ is not necessary. Individual previously damaged SPDs can be simply replaced in case of maintenance or, at a first-time starting of a system, they can be programmed on site for application (presetting for starting = all SPDs previously damaged).

Arrester programming will be implemented by the respective stationary DRC MCM XT monitoring device by using the 3-way button and by observing the LED status display.

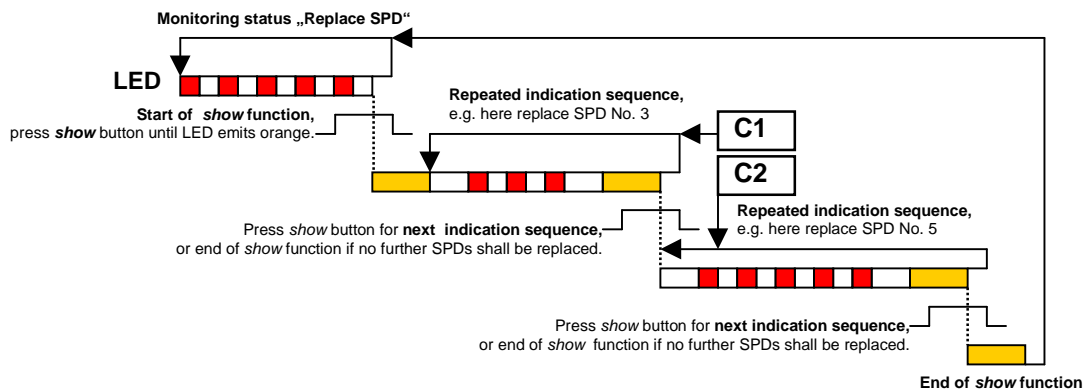
In the following a description of how to interrupt the standardised "show" function process and how to perform programming of one or several arrester modules.

6) See 9.2 Offline programming by DRC LC M3/M3+ reading device

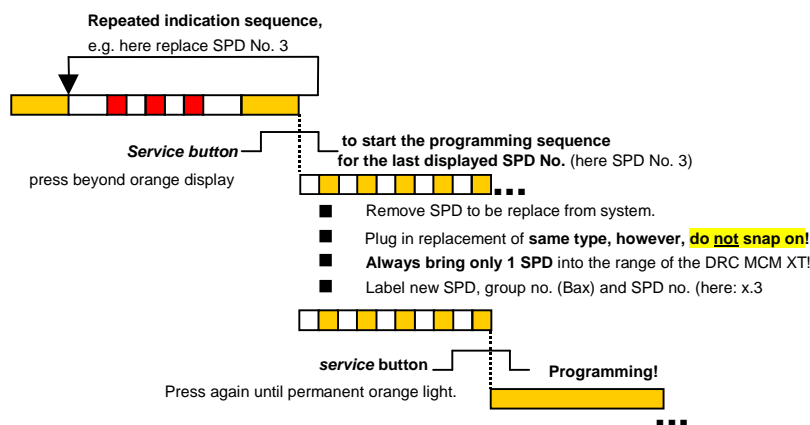
7) Siehe 9.1 Online programming by PC and DRC MCM XT monitoring device

Procedure:

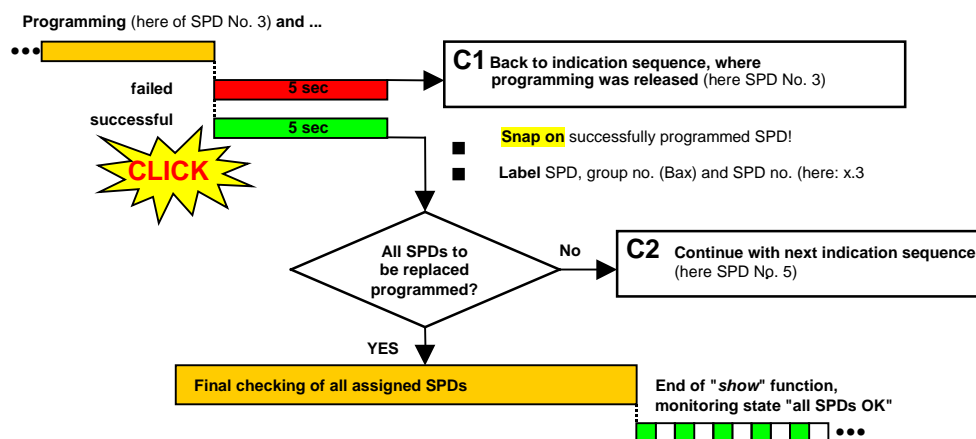
Identification/location of the SPD to be replaced / programmed by the "show" button.



Activate the programming sequence and start the programming process by the "service" button:




Further sequence of programming:




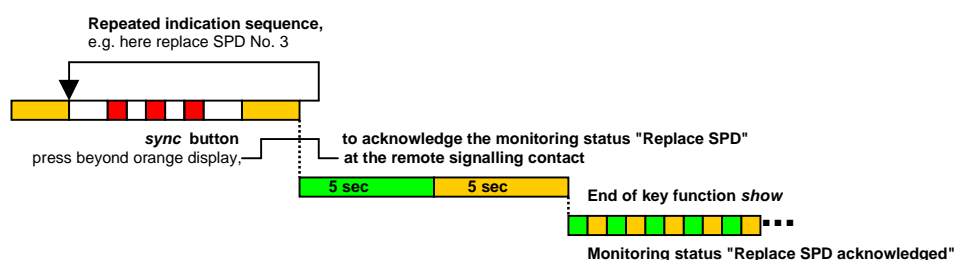
Note: The programming sequence can not be interrupted, i.e. only by interrupting the voltage supply or only after the programming sequence with/without SPD has been completely finished, the programming process can be closed.

13.1.2 Acknowledgement of the remote signalling contact




Within the "show" function the remote signalling contact of the DRC MCM XT can be reset via the 3-way button by acknowledgement even in case of a still existing fault (fault acknowledgement of an issued alarm).


Based on the standard sequence of the "show" function, acknowledgement of the remote signalling contact can be activated by applying the "sync" key function during the "blinking" indication of the faulty SPD ("RED" blinking stands for SPD number). Apply the "sync" button until the LED shows "GREEN" ( approx. 5 sec).


Then the remote signalling contact will be reset  approx. 5 sec and the "show" function will be closed immediately.









In the further procedure the "Fault acknowledged" state is indicated

(), except the DRC MCM XT is in the service mode
() or it is restarted after interruption of the supply voltage
()

If the DRC MCM XT in "Fault acknowledged" state identifies another SPD as previously damaged, acknowledgement of the faulty state will be automatically reset, the remote signalling contact will be released again and the indication changes into the actual indication status again ().

As soon as all previously damaged arresters in the system have been replaced and programmed, the indication changes into the standard operation mode again ().

		
		
LED	FM 13-14, no	FM 21-22, nc

Whereas the "Fault acknowledged" state will be reset when starting the DRC MCM, the information "Acknowledgement performed" will be saved in the FLASH storage of the DRC MCM XT and will be automatically reset only after all SPDs (according to DIP switch configuration) have been tested "OK". If "Acknowledgement performed" is set in the FLASH storage, the information text "**FM acknowledged**" will be attached to the software version when reading out the DRC MCM XT software version in the Service Console /3/.

Example:

HW version v1.062


SW version v1.008-12/10/2009-**FM acknowledged**

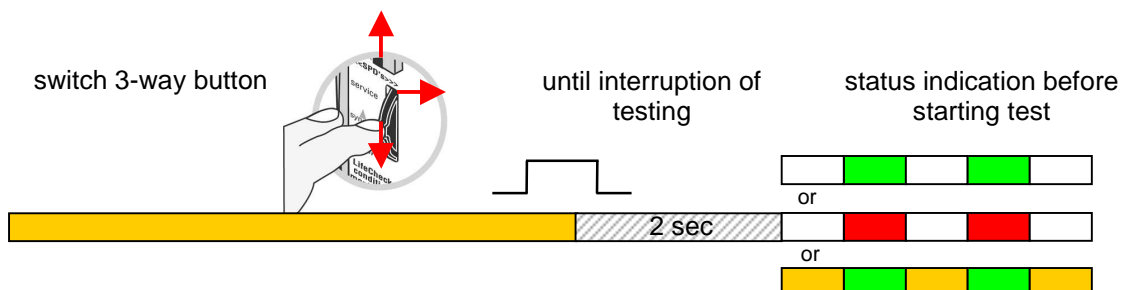
Important note!

If the indication status "Replace SPD" has been acknowledged, and thus the RS contact in the system reset at the DRC MCM, there will not be any further status message (e.g. to a central control station) of one or several arresters to be replaced except, new status modifications will occur in the meantime in the system.

Acknowledgement of the RS contact and the following replacement incl. password programming for identifying the arresters in the monitoring group thus is in the user's responsibility. The user has to take care and make sure that an arrester identified as previously damaged will be replaced as soon as possible also after acknowledgement of the RS contact.


13.2 Stopping a running test procedure

By optional activation of the 3-way button at the DRC MCM XT a running test of a () monitoring group can be stopped without having to activate the respective key function. Identification of the key activation as condition of truncation can take up to 30 seconds. Acceptance of the condition of truncation will be signalled by interruption of the indication (LED goes out for 2 seconds). After having stopped the test procedure, the last completely determined status of the monitoring group will be displayed (=status before starting the test, i.e. the status partly achieved during the checking that was stopped, remains unconsidered).



During the status indication the respectively required action (**service - sync - show**) then can be carried out by corresponding activation of the 3-way button.

13.3 Testing for the existence of non configured Blitzductors

When starting up the DRC MCM XT reads its bus address and the number of SPDs to be checked from the configured DIP switches. In operation then only the SPD numbers from 1 up to the configured quantity of SPDs will be checked. In order to verify whether more SPDs might have been programmed and plugged than wrongly configured via the DIP switches, the DRC MCM XT checks **once after starting up during the first test sequence** also all SPD numbers which exceed the configured quantity of SPDs up to and including SPD number 10 for existence. If an SPD number is identified which exceeds the configured quantity of SPDs, "Fault DIP configurations" will be signalled () and the DRC MCM XT stays in an endless loop in this state until the user intervenes and corrects the configuration of the DIP switches attached on the side of the DRC MCM XT.

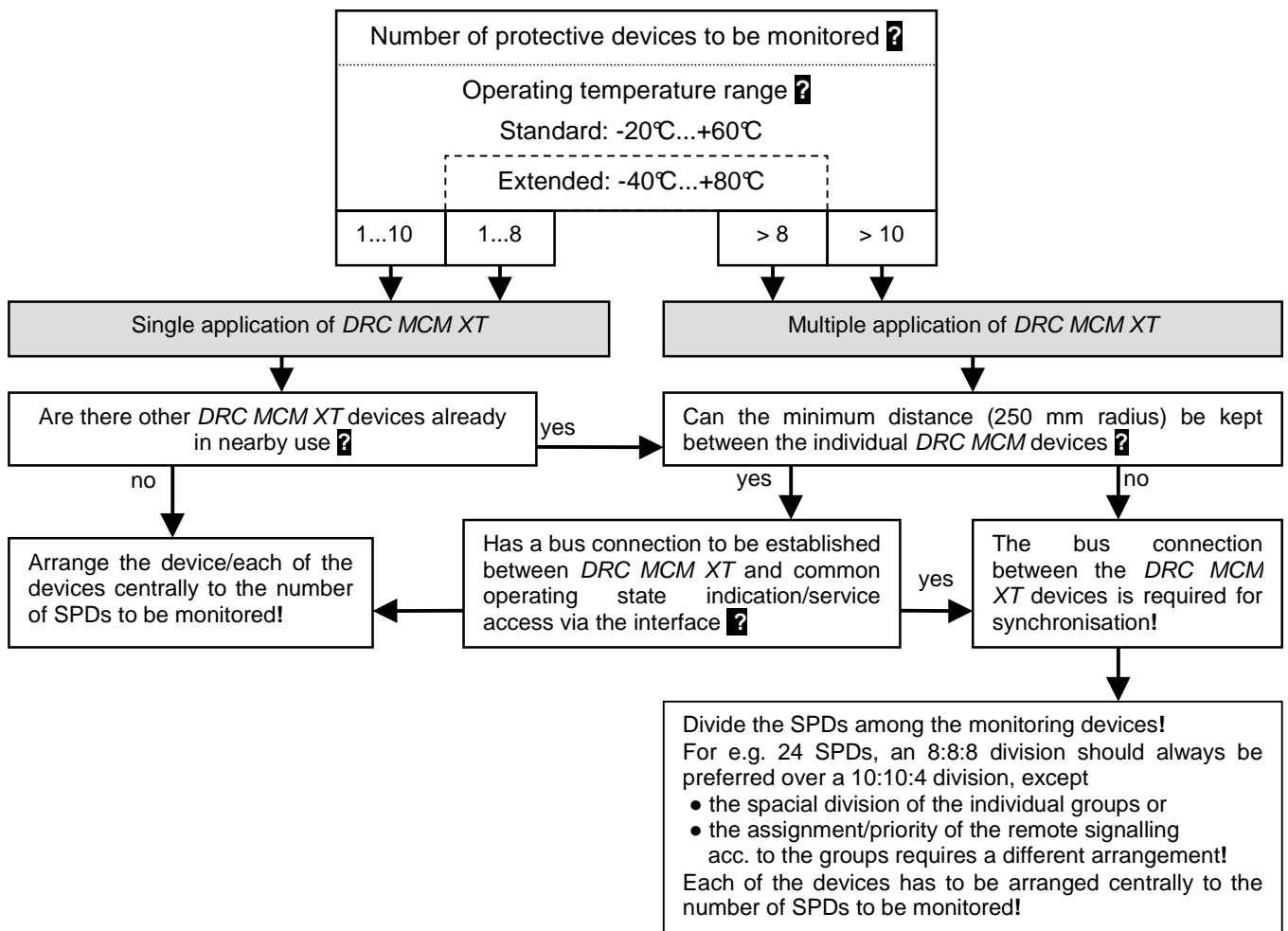
14. Technical data


	Technical data	DRC MCM XT
Power supply	Nominal voltage (perm. range) U_{IN}	24 (18...48) V _{d.c.}
	Nominal current input I_{IN}	80 (100...60) mA
	Insulation	none, GND indirectly earthed
	Clamp designation at base part	+/- ; -/+
	Screw terminal at base part	0,08...2,5 mm ² flexible 0,08...4 mm ² solid
	Polarity	optional
	Integrated polyswitch fuse	0,3 A; 60V; I_{BR} max. 10A
SPD monitoring with LifeCheck®	Number of SPDs	1...10**
	Configuration of qty. (perm. range)	by DIP switch (1...10) on the side
	Arrangement of the device	centrally between the SPDs
	Monitoring principle	cyclical queries
	Monitoring parameter	RFID 125 kHz
	Typical time until first testing after starting: Starting sequence	30 sec (basic time) + n x 10 sec (variable, n $\hat{=}$ BA) + 30 sec synchronisation time
	+synchronisation	
Remote signalling contact (RS)	Type	Floating break and make contact
	Max. switching parameters	max. 300 mW, each d.c. 350 V ; 120 mA a.c. 250 V ; 70 mA
	Insulation	1500 V _{a.c.}
	Clamp designation of base part	13 ; 14 (contact 1, make contact, no) 21 ; 22 (contact 2, break contact, nc)
	Screw terminal of base part	0,08...2,5 mm ² flexible 0,08...4 mm ² solid
Monitoring status		
Interface (COM)	Type	RS 485; half duplex (HD)
	Insulation	none
	Clamp designation of base part	A ; B
	Screw terminal of base part	0,08...2,5 mm ² flexible 0,08...4 mm ² solid
	Termination impedance $R_T = 120 \Omega$	bottom, can be activated or deactivated by slide switch/jumper
	Bus load	1/8, i.e. theoretically 256 bus devices
	Address of bus device (perm. range)	by DIP switch (1...15) on the side
	Transmission rate	9,6 kbit/sec
	Length of bus connection	up to 1200 m (according to the conductor used!)
	Function / Application - Synchronisation of several devices - Service access	- thus no min. distances have to be kept for installation - by PC
Environmental conditions	Operating temperature range	standard -20 ... +60 °C (** 1...10 SPD) extended -40 ... +80 °C (** 1...8 SPD)
	Operating site/height	up to max. 2000 m / if $U_{FM} > 33 V_{rms}$ or 70 V _{d.c.} above 2000 m / if $U_{FM} < 33 V_{rms}$ or 70 V _{d.c.}
Mounting	on	35 mm metal DIN rail according to EN 60715
	Minimum distance from device to device (radius)	250 mm (without synchronisation by COM)














	Technical data	DRC MCM XT
Enclosure material		polyamide PA 6.6 (electro grey, RAL 7035)
Degree of protection		IP 20
Dimension	Type	<i>BLITZDUCTOR® XT</i> design
	Width (DIN 43880)	12 mm (2/3 TE)
	Depth without terminals	90 mm
	Height above DIN rail	66 mm
Weight		62 g
Relevant standards	Safety (electrical measuring devices)	EN 61010 – 1
	EMC	
	- Immunity (industry) - Transient emissions (private homes)	EN 61000 – 6 – 2 EN 61000 – 6 – 3
Settings in as-delivered state	Number of SPDs to be monitored	DIP_switch = 0
	Address of bus device/group No.	DIP_switch = 0
	Bus termination impedance	slide switch/jumper = On

	DRC MCM XT	
Delivery includes	plug-in module with base part	
	quick guide	Publication 1666
	labelling system (1 pc.)	BS BA1 BA15 BXT, Part No. 920 398 , 1x 165 adhesive labels, printed with Busadresse BA1...BA15 and with SPD Nos. 1.1-15.10
Accessories	Ex i-separator	TW DRC MCM EX, Part No. 910 697 (new)
	Interface converter	DRC USB NANO 485, Part No. 910 486

15. Projection/Notes on application



	Single application of <i>DRC MCM XT</i>	Multiple application of <i>DRC MCM XT</i>
Minimum distance	Keep a minimum distance (250 mm radius) between all individual <i>DRC MCM XT</i> !	No minimum distance required.
Terminals	Only the supply voltage is needed for operation.	Apart from being connected to the supply voltage, the individual <i>DRC MCM XT</i> have also to be connected with each other in parallel for synchronising them via the bus terminals (A, B).
Configuration of address / group No.	The bus address/group No. can be set (DIP switch) as preferred by the user. It only has to correspond to the parameters of the protective devices to be monitored.	For the individual devices and the corresponding groups of protective devices, different bus addresses/group Nos. have to be selected.
Configuration of bus termination impedance	It is advisable that the termination impedance R_T of the interface remains active or is activated due to interference immunity.	Only the termination impedances of the two <i>DRC MCM XT</i> situated at the respective ends of the bus system have to be activated, the <i>DRC MCM XT</i> in between have to be deactivated.
Starting the monitoring (sync button)	For monitoring the protective devices, each <i>DRC MCM XT</i> has to be set to master mode.	Only one of the <i>DRC MCM XT</i> within the group has to be set to master mode. This assumes the automatic synchronisation of the monitoring. The other devices remain in the slave mode.
Configuration of the number of protective devices to be monitored	The number of SPDs assigned to the respective <i>DRC MCM XT</i> will be set via DIP switch.	
Monitoring status	<p>Each <i>DRC MCM XT</i> device, even if several devices are synchronised, indicates only the operating state of the SPDs assigned to it to the LED and remote signalling contact. The monitoring status distinguishes between</p> <p>  all SPDs assigned to this <i>DRC MCM XT</i> device are alright at least one of these SPDs has to be replaced status "Replace SPD" for RS contact acknowledged </p> <p>After switching on the device or if the voltage has been interrupted, the operating state remains at "Replace SPD!" until the 1st LifeCheck®!</p>	
Programming the protective devices	A precondition for stationary monitoring by means of a <i>DRC MCM XT</i> device is that each SPD has been programmed with a password. This consists of the bus address/group No. of the monitoring device assigned and the current number within the group to be monitored. The current numbers of the group always start with 1 and end with the number of the SPDs to be monitored, which is configured on <i>DRC MCM XT</i> .	
Marking	In order to avoid mistakes and to ensure a quick and easy replacing of the SPDs in case of a failure, both the monitoring device (with its bus address) and each protective device should be marked (preferably with a combination of group No. and current number, e.g. 3.1...3.9, 3.10 for 10 SPDs of group 3). For this purpose, please use the BS BA1 BA15 BXT labelling system (Part No. 920398) included in delivery.	
Remote signalling contact	Both electrically isolated remote signalling contacts, i.e. break and make contact, report the current monitoring status by floating remote signalling.	

	Single application of <i>DRC MCM XT</i>	Multiple application of <i>DRC MCM XT</i>
LED	<p>The 3-colour LED signalises the</p> <p><u>Operating state (device)</u> means, independent from the blinking frequency,</p> <div><div></div> Starting/Starting sequence</div> <div><div></div> Service mode activated</div> <div><div></div> Operating state (device), failure/wrong configuration (DIP switches)</div> <div><div></div> Programming sequence started at the show function</div> <div><div></div> Current programming at the show function</div> <p><u>Monitoring status</u>, means, independent from the blinking frequency,</p> <div><div></div> All protective devices monitored alright</div> <div><div></div> At least 1 of the protective devices has to be replaced</div> <div><div></div> Acknowledged state "Replace SPD"</div> <div><div></div> Test in process</div> <p>Independent from the colour,</p> <div><div>- fast blinking </div> means "device set to master mode"</div> <div><div>- slow blinking </div> means "device set to slave mode"</div>	
3-way button	<p>3-way button for controlling <i>DRC MCM XT</i> with the following functions:</p> <div><div>service</div> activates or deactivates the service mode (extended interface functions)</div> <div><div>sync</div> changes between slave mode and master mode, i.e. starts or stops the monitoring, which also includes the automatic synchronisation of several devices connected with each other via the bus</div> <div><div>show</div> starts or cycles the detailed operating state indication via the LED</div> <p>The button is applied by pressing it vertically (sync) or moving it without pressure upwards (service) or downwards (show).</p> <p>The button has to be applied for min. 2 seconds or until the corresponding function is initiated. During the test process (LED, permanent orange light), no further application of the button will be accepted!</p>	
Starting operation	<p>In the as-delivered state, each <i>DRC MCM XT</i> starts operating in the slave mode, if there is a permissible configuration of the DIP switch. Otherwise it starts indicating a failure.</p>	
Slave mode	<p>The slave mode is signalised by a slowly blinking LED. The device remains passive, i.e. it will initiate no testing of SPDs itself, but wait for a corresponding command from the master device via interface  , or react upon applying a button.</p> <p>After the synchronisation or testing initiated by the master device, the current operating state will be indicated.</p>	
Master mode	<p>The master mode is indicated by a fast blinking LED. When starting operation, the synchronisation test is performed during the starting sequence  , i.e. the device verifies if there is another <i>DRC MCM XT</i> master device used at the bus. If this is the case, it resets itself automatically to the slave mode. Otherwise, the device searches all slave devices during the synchronisation. Cyclically, the master will first perform the test of its "own" SPDs, before it will initiate the testing of the slave devices.</p>	

16. Warnings

The device may only be connected and installed by a qualified electrician. National regulations and safety rules must be observed.

Before use, the *DRC MCM XT* device has to be checked for external damage. If any damage or other fault is found, the device must not be installed.

The device may be used within the scope of the conditions mentioned and shown in the relevant installation instructions only.

Loads exceeding the values provided may damage the *DRC MCM XT* and the electrical equipment connected to it.

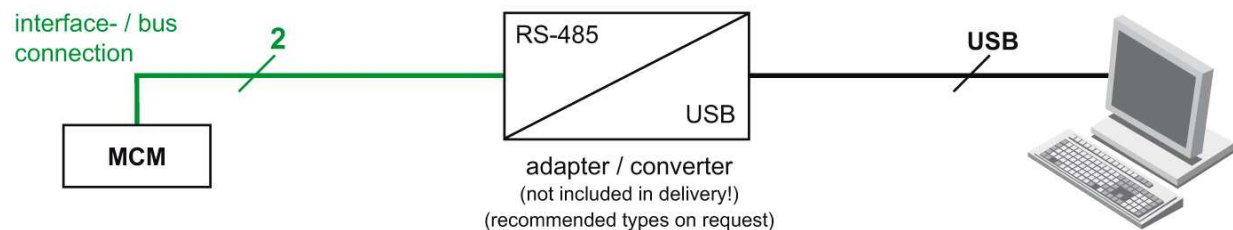
Any modification or tampering with the device will invalidate the warranty.

For ambient temperatures of +40°C ... +80°C, correspondingly high surface temperatures and thus a burn hazard has to be reckoned with when applying the *DRC MCM XT* device.

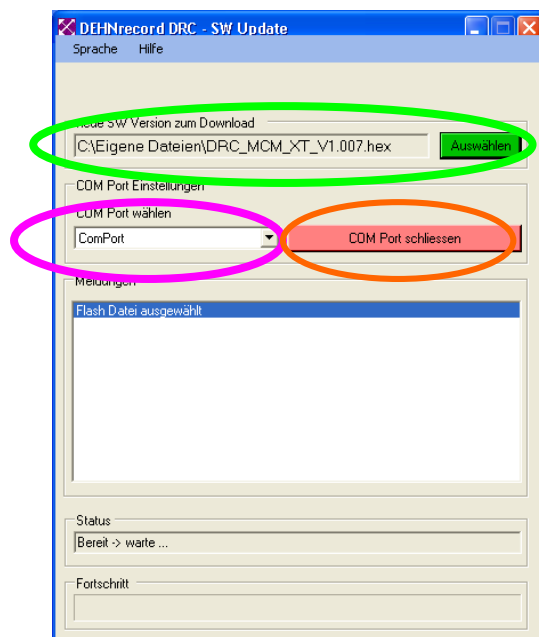
17. Maintenance and care

17.1 Software update

The following procedure describes an updating of the device software via interface:




- Remove the monitoring module
- Establish an interface-/bus connection from the base part to the PC. Observe the configuration of the bus termination impedances (R_T) at the same time.²⁾
- Open the installed PC software “*DRC SW-Update*” ^{12/}



- Select the HEX file of the new device software on the user interface, then select the COM port of the interface used and open them.
- Move all DIP switches of the monitoring module to OFF position.
- Plug the monitoring module into the base part.

2) See 8.3 Interface termination impedance

- Automatic download starts when connecting the device to the power supply. The process can be followed via the user interface.
- End of transmission will be indicated in the status bar of the PC software and by the blinking LED  of the *DRC MCM XT* device.
- Remove the *DRC MCM XT* module and reestablish the required/original configuration of the DIP switches.
- When plugging in the *DRC MCM XT* it starts with the new software in the mode which was used before the update (slave or master).

17.2 Cleaning

For this purpose, the monitoring module has to be removed and the base part has to be disconnected and removed from all connecting cables.

For cleaning the device, use a soft cloth, which is slightly moistened with water.

Any entering of humidity into the device must really be avoided.






17.3 Transport and storage





When transporting and storing the *DRC MCM XT* device, it has to be ensured that its usage properties are not impaired. For this purpose, the original packaging should be used.



Storage:

- In closed rooms
- Relative air humidity < 85 %
- Temperature -40°C to +80°C
- No exposure to direct sunlight
- The device has to be stored under dry conditions and protected against dirt.

18. Problems / Possible solutions

Problem	Causes of fault / Possible solutions
LED is not illuminated/blinking after plugging the module into the base part.	Faulty power supply <ul style="list-style-type: none"> - Check the connections! - Check the power supply!
LED is blinking only 	Fault indication, impermissible configuration <ul style="list-style-type: none"> - Check the settings of the DIP switches on the side of the device! Permissible ranges: <ul style="list-style-type: none"> -- Number of SPDs to be tested: 1...10 -- Bus address / Group No.: 1...15
LED is blinking only  (quickly)	Starting sequence of master device, i.e. synchronisation test in process. <ul style="list-style-type: none"> - Wait until the end of the test, 40 seconds (bus address 1) to 180 seconds (bus address 15)!
LED is blinking only  (slowly)	Starting sequence of slave device, i.e. the device waits for application of a button or a command via interface <ul style="list-style-type: none"> - Check the application/configuration! <ul style="list-style-type: none"> -- For single applications: Switch the <i>DRC MCM XT</i> to master mode by applying the sync button to start the monitoring -- For multiple applications: One of the <i>DRC MCM XT</i> devices connected via interface must work as a master device! If so, wait until the end of the synchronisation test and synchronisation. Thereafter and if the master works properly, check the interface connection! <ul style="list-style-type: none"> --- Are the interfaces connected in parallel (A – A, B – B)? --- Are the termination impedances properly activated or deactivated (max. 2 activated, i. e. for the first and last <i>DRC MCM XT</i> device situated at the bus)?
Monitoring status is permanently indicating "Replace SPD"  (blinking frequency irrelevant)	No test has been performed yet! <ul style="list-style-type: none"> - The operating state of a <i>DRC MCM XT</i> device remains at "Replace SPD" until the first <i>LifeCheck</i>®! If necessary, wait until the end of the cycle in case of several/many synchronised devices (approx. 1 minute per <i>DRC MCM XT</i>, if all SPDs are alright) - Termination impedances properly activated/deactivated? The termination impedance should also be activated for single applications due to interference immunity! <p>Is a test being performed at all  ?</p> <ul style="list-style-type: none"> - slave device, which is no longer called, as <ul style="list-style-type: none"> -- there is no master device working in the group! -- the interface is interrupted! - Is the orange LED flashing during testing? - Test power supply (voltage range, permissible output current, smoothing)! <p>Detailed determining of the SPD indicated as "faulty" (via show button, via Status Display + Service Console PC software, via <i>DRC LC M3+</i> hand-held reading device)!</p> <p>If, for example, all numbers or only the high current numbers of the SPDs to be monitored are requested to be replaced, there is most probably a basic failure!</p>

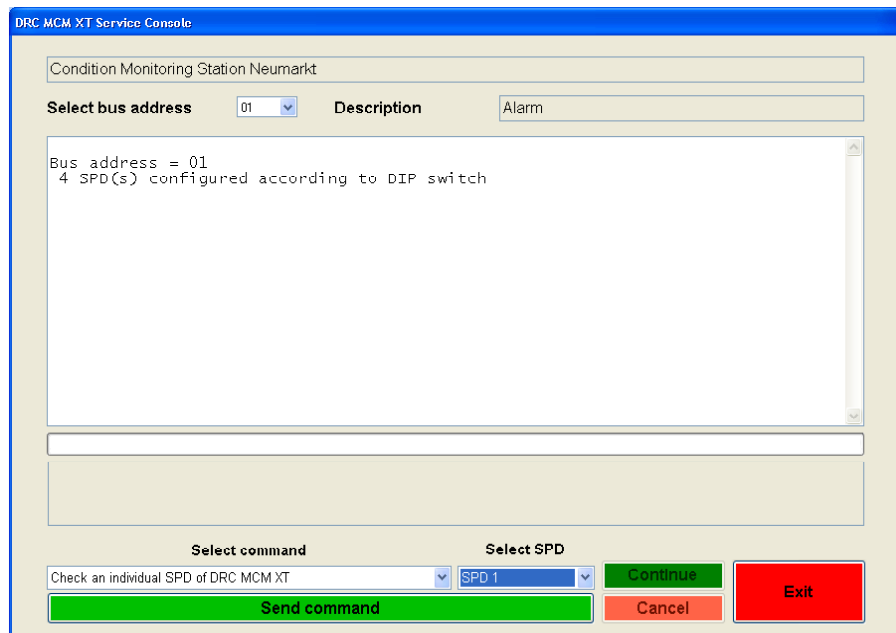
Problem	Causes of fault / Possible solutions
	<ul style="list-style-type: none"> -- Is the configuration of the bus address/group No. and number of SPDs to be monitored correct? -- Have all SPDs been programmed? A single unprogrammed SPD can result in other SPDs being indicated as faulty, too!
Protective device, which is unknown to be programmed or not and how	<ul style="list-style-type: none"> - The <i>DRC LC M3+</i> reading device can both check if SPDs are unprogrammed (Menu:Check; quick or periodic) and also provides a function for searching programmed SPDs (Main Menu <i>DRC MCM</i>; Check or search SPD), which, however, can be very time-consuming, if the group No. is unknown as well. If required, increase the number of SPDs to be searched to max. 10 SPDs and repeat search. - When using the <i>DRC MCM XT</i> device, the search function is also available in connection with the <i>Status Display + Service Console</i> PC software. For this purpose, only one SPD may be plugged in. All other SPDs must not be located in the vicinity of the <i>DRC MCM XT</i>. <p>Both <i>DRC MCM XT</i> and SPDs should absolute be marked!</p>
The hand-held reading device supports no <i>DRC MCM XT</i> functions. (Main menu: <i>DRC MCM</i>)	<p>Check the version of the device!</p> <ul style="list-style-type: none"> - Only <i>DRC LC M3+</i> reading device with Part No. 910 653 is supplied with the corresponding software functions. Minimum version of <i>DRC LC M3+</i> required for providing current <i>DRC MCM XT</i> functions: V1.2.0.0 04 August 2009
No <i>LifeCheck</i> ® is performed in a group of 2 or several devices. The master device is blinking  (quickly), the slave device/s is/are slowly blinking  or 	<p>Check the interface connection!</p> <ul style="list-style-type: none"> - Are the interfaces connected in parallel (A - A, B - B)? - Are the termination impedances correctly activated or deactivated? (min. 2 not activated any more, i. e. at the first and last <i>DRC MCM XT</i> device located at the bus)?
The slave devices are blinking again like for the starting sequence  , although the monitoring has already been started correctly.	<p>Check the master device or interface connection!</p> <ul style="list-style-type: none"> - After 60 minutes without access from the interface, a slave device will be reset to the initial/starting sequence, i.e. the malfunctioning monitoring will be signalled via the corresponding "Replace SPD" indication for all protective devices assigned to it. -- If only one or several devices are affected, this might have been caused by an interface interruption. -- If all slave devices are affected, the master device does not work properly any more or might have been deactivated
No <i>LifeCheck</i> ® is performed any more for 2 or several devices. The master device indicates the operating state of "its" SPDs, but without performing further tests.	<p>Check the slave devices!</p> <ul style="list-style-type: none"> - A master device waits for max. 15 minutes for the feedback signal of the slave device for which started the last test. Possible reasons might be <ul style="list-style-type: none"> -- "faulty" SPDs extremely extend testing time (+ 1 minute per faulty SPD) due to lacking or incorrect programming -- the slave device was removed during the test or had a failure -- the interface connection was interrupted or disturbed <p>Then, the master device continues its cycle of synchronisation and tests.</p>

Problem	Causes of fault / Possible solutions
<p>Reverse the acknowledgement of the "Replace SPD" status for the remote signalling contact.</p> 	<p>Acknowledgement is cancelled as soon as the DRC MCM XT will be reset, i.e.</p> <ul style="list-style-type: none"> -by the key function <i>sync</i> -by interruption of the supply voltage -when the module is being removed <p>Now the "Replace SPD" status will be indicated until the next LifeCheck and after that the actual status will be indicated again and signalled via the remote signalling contact.</p>
<p>Is it possible to stop a testing or is it necessary to wait until termination before an access by key function is possible? </p>	<p>The running test may be interrupted by pressing an optional key. Press the key until the LED goes out (max. 30 sec). The determined uncomplete monitoring status remains unconsidered. Then the respective key function can be carried out again by activating the key again.</p>
<p>Possible problems during installation of the <i>Service Console + Status Display</i> PC programs which are available at www.dehn.de/download/</p>	<p>Check the system requirements/settings!</p> <ul style="list-style-type: none"> - .NET-Framework[®] compatible Microsoft operating system (Windows[®] 98, ME, 2000 SP3, XP, Vista[®]) - The PC should at least have a Pentium III processor with 700 MHz and 256 MB RAM, support a graphic board with 1024x768 pixels and 256 colours, provide a USB interface and a free memory of 100 MB. - Regarding required administrator user rights please ask your system administrator or check the settings of the PC under Control Panel User Accounts. - The automatic download of .NET-Framework[®] 2.0, if not already available, requires the Microsoft Software Installer (MSI) > Version 3.0 and Microsoft Internet Explorer > Version 5.0 as well as access to the Internet - Already installed programs can be taken from an overview under Control Panel Software. There are all individual programs listed in alphabetical order after successful installation: <ul style="list-style-type: none"> -- <i>DRC MCM XT Status Display + Service Console</i> -- Microsoft .NET Framework 2.0 -- Windows Installer 3.0
<p>No RS485 interface existing/available.</p>	<p>Establish the connection with a common USB/RS485 converter, the driver of which has to be installed before use!</p> <ul style="list-style-type: none"> - As soon as the converter is connected to the PC, the COM port now available, e.g. USB RS485 Port (COM6), can be found on the PC under Control Panel System Hardware Device Manager Connections (COM and LPT).
<p>The error message "Access to connection of COM No. denied" is displayed when starting the <i>Status Display</i> or <i>Service Console</i> program or when selecting the COM port.</p>	<p>This means that the interface is already occupied by another program. This program has to be terminated first. For example, some connection programs for PDAs or Palms occupy all available interfaces and are also listed in the Autostart directory of the Start menu.</p>

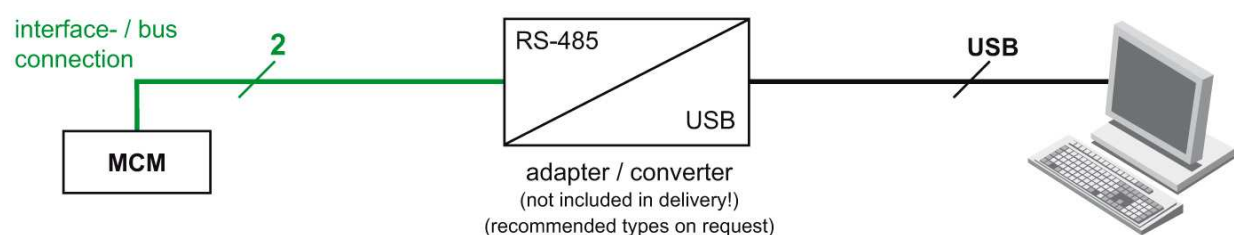
18.1 Service mode

The **Service Console** PC software in the *Status Display + Service Console* program provides an excellent tool for obtaining detailed information from the monitoring device and about the monitoring status of the SPDs in case of arising problems and for service work to be performed.

The program including operating manual can also be obtained at the following internet address: www.dehn.de/download/.



A necessary precondition is the installation of the program on the PC, which is connected to the monitoring devices via bus (observe configuration of the termination impedances (RT) of the bus!)²⁾.



For accessing the *DRC MCM XT* device or devices, all devices situated at the bus must be set to slave mode, i.e. they are inactive. For this purpose, apply the **sync** button at the master device.

Then activate the service mode for every *DRC MCM XT* device you would like to access. For this purpose apply the **service** button.

²⁾ See 8.3 Interface termination impedance

The software provides the following functions:

- Total test of all protection modules assigned to a *DRC MCM XT* device
- Single testing of a protection module
- Determining the current number of a protection module
- Programming of all unprogrammed protection module of a DRC MCM XT
- Programming an individual protection module
- Resetting a protection module
- Reading out the software state of a *DRC MCM XT*

After closing the *Service Console* the status of the SPDs installed can be determined and monitored with the function "Status Display". For this purpose one *DRC MCM XT* device in the system has to be configured as master (**sync** button, see page 7, 3-way button for controlling the *DRC MCM XT*).⁸⁾

8) See 5. Description of device

**Lightning Protection
Surge Protection
Safety Equipment**

DEHN + SÖHNE
Hans-Dehn-Straße 1
Postfach 1640
92306 Neumarkt
Germany

Tel. +49 9181 906 - 462

Fax +49 9181 906 - 444

www.dehn.de

export@dehn.de