Security & Electronic Technologies GmbH

Level Remote Control

LRC-Small

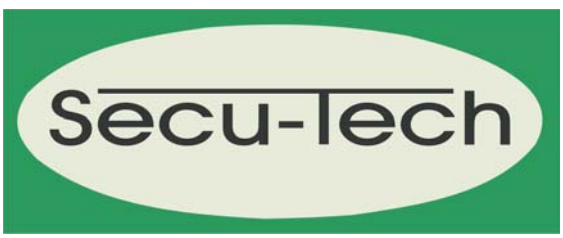
Service- and User-Manual

Document: LI099
1st May 2007

This document is available at
http://www.secu-tech.at

Security & Electronic Technologies GmbH

A-2544 Leobersdorf, Aumuehlweg 3/1, Tel. +43-2256-20177-0
Fax. +43-2256-20177-11, Email: office@secu-tech.at
Web: www.secu-tech.at



This manual is referring to the actual software version in the system modules:

Device	Software version
LRC-Small	4.0
LRC-Small/Remote	4.0
LRC-RC2	2.0
LRC-Charger	4.0
LRC-Charger/REC	1.1

Device	Software version
LRC-Small/Ship	2.8
LRC-Small-CH	12.0
Remote-CH	12.1
LRC-Charger-CH	12.2
Remote/Air	8.1
LRC-Charger/Air	8.0
LRC-Small/Opto	1.5
LRC-RC2-CH	12.0
LRC-Charger for LRC-Small/Ship or LRC-Small/Opto	2.3

The functionality depends on the configuration which you have in use resp. also on

Contents

Chapter E - Description of components and functions

Chapter F - Trouble-shooting and Application hints

Chapter A

Scope of Delivery
and
Item description

Scope of delivery and item description -
TRbF-systems for mineral oil-, chemical industry...

Ord. No.	Item	Description
FF001	**LRC-Small complete**	**Ex-radio-controlled fill protection system for thermistor probes (TRbF)**
	LRC-Small	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-battery for LRC-Small
	LRC-Charger	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial box for outdoor-installation for connection to LRC-Charger
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug cable for connection LRC-Charger to aerial


LRC-Charger


LRC-Small incl. LRC-Small/Batt


LRC-Charger/Rec Outdoor

FF002	**LRC-Small complete +**	**Ex-radio-controlled fill protection system with additional Ex-portable transmitter**
	LRC-Small	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-battery for LRC-Small
	LRC-Charger	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial box for outdoor-installation for connection to LRC-Charger
	LRC-Small/Remote	Additional Ex-portable transmitter with remote control functions
	LRC-Small/Batt	Ex-battery for LRC-Small/Remote
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug cable	9 m stereo-jack-plug cable for connection LRC-Charger to aerial


LRC-Charger


LRC-Small incl. LRC-Small/Batt


LRC-Small/Remote incl. LRC-Small/Batt


LRC-Charger/Rec Outdoor

FF003	**LRC-Small complete + RC2**	**Ex-radio-controlled fill protection system with additional portable transmitter**
	LRC-Small	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-battery for LRC-Small
	LRC-Charger	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial box for outdoor-installation for connection to LRC-Charger
	LRC-RC2	Additional portable transmitter with remote control functions
	2 NiMH-batteries	2 NiMH batteries for LRC-RC2
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug cable for connection LRC-Charger to aerial


LRC-Charger


LRC-Small incl. LRC-Small/Batt


LRC-Small/RC2 incl. 2 NiMh batteries


LRC-Charger/Rec Outdoor

DL003 ANA-Function — **ANA-Functionality to be activated by LRC-Charger**

ANA-Function optional to items FF001, FF002, and FF003, please order separately!

Scope of delivery and item description - TRbF-systems for LPG

Ord. No.	Item	Description
FF004	**LRC-Small/Gas complete**	**Ex-radio-controlled fill protection system for LPG**
	LRC-Small/Gas	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small
	LRC-Charger	Charger and Amplifier
	LRC-Charger/REC Outdoor	Aerial-box for outdoor installation for connection to LRC-Charger
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug-cable for connection LRC-Charger to aerial

LRC-Charger

LRC-Small/Gas incl. LRC-Small/Batt

LRC-Charger/Rec Outdoor

Ord. No.	Item	Description
FF005	**LRC-Small/Gas complete +**	**Ex-radio-controlled fill protection system with additional Ex-portable transmitter**
	LRC-Small/Gas	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small
	LRC-Charger	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial-box for outdoor installation for connection to LRC-Charger
	LRC-Small/Remote	Additional portable Ex-transmitter with remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small/Remote
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo jack plug cable	9 m stereo-jack-plug-cable for connection LRC-Charger to aerial

LRC-Charger

LRC-Small/Gas incl. LRC-Small/Batt

LRC-Small/Remote incl. LRC-Small/Batt

LRC-Charger/Rec Outdoor

Ord. No.	Item	Description
FF006	**LRC-Small/Gas complete + RC2**	**Ex-radio controlled fill protection system with additional portable transmitter**
	LRC-Small/Gas	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-Battery LRC-Small
	LRC-Charger	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial box for outdoor installation for connection to LRC-Charger
	LRC-RC2	Additional portable transmitter with remote control functions
	2 NiMH-batteries	2 NiMh-batteries for LRC-RC2
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug-cable for connection LRC-Charger to aerial

LRC-Charger

LRC-Small/Gas incl. LRC-Small/Batt

LRC-Small/RC2 incl. 2 NiMh batteries

LRC-Charger/Rec Outdoor

Scope of delivery and item description - optical-systems

Ord. No.	Item	Description
FF007	**LRC-Small/Opto complete**	**Ex-radio controlled fill protection system for optical probes**
	LRC-Small/Opto	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small
	LRC-Charger	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial box for outdoor installation for connection to LRC-Charger
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug-cable for connection LRC-Charger to aerial

LRC-Charger

LRC-Small/Opto incl. LRC-Small/Batt

LRC-Charger/Rec outdoor

FF008	**LRC-Small/Opto complete +**	**Ex-radio controlled fill protection with additional portable Ex-transmitter**
	LRC-Small/Opto	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small
	LRC-Charger	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial box for outdoor installation for connection to LRC-Charger
	LRC-Small/Remote	Portable Ex-transmitter with remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small/Remote
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug-cable for connection LRC-Charger to aerial

LRC-Charger

LRC-Small/Opto incl. LRC-Small/Batt

LRC-Small/Remote incl. LRC-Small/Batt

LRC-Charger/Rec outdoor

FF009	**LRC-Small/Opto complete + RC2**	**Ex-radio controlled fill protection with additional portable transmitter**
	LRC-Small/Opto	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small
	LRC-Charger	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial box for outdoor installation for connection to LRC Charger
	LRC-RC2	Portable transmitter with remote control functions
	2 NiMH batteries	2 NiMH batteries for LRC-RC2
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo jack-plug-cable for connection LRC-Charger to aerial

LRC-Charger

LRC-Small/Opto incl. LRC-Small/Batt

LRC-Small/RC2 incl. 2 NiMh batteries

LRC-Charger/Rec Outdoor

Scope of delivery and item description - optical systems for Switzerland

Art. No.	Item	Description
FF010	**LRC-Small/Opto-CH complete**	**Ex-radio controlled fill protection system for optical probes**
	LRC-Small/Opto-CH	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small
	LRC-Charger-CH	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial box for outdoor installation for connection to LRC-Charger
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug cable for connection LRC-Charger to aerial

LRC-Charger-CH

LRC-Small/Opto-CH incl. LRC-Small/Batt

LRC-Charger/

Art. No.	Item	Description
FF011	**LRC-Small/Opto-CH complete +**	**Ex-radio-controlled fill protection with additional portable Ex-transmitter**
	LRC-Small/Opto-CH	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small
	LRC-Charger-CH	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial box for outdoor installation for connection to LRC-Charger
	LRC-Small/Remote-CH	Additional portable ex-transmitter with remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small/Remote
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug cable for connection LRC-Charger to aerial

LRC-Charger-CH

LRC-Small/Opto-CH incl. LRC-Small/Batt

LRC-Small/Remote-CH incl. LRC-Small/Batt

LRC-Charger/Rec Outdoor

Art. No.	Item	Description
FF012	**LRC-Small/Opto-CH complete + RC2**	**Ex-radio controlled fill protection with additional portable transmitter**
	LRC-Small/Opto-CH	Ex-portable transmitter with overflow protection and remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small
	LRC-Charger-CH	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial box for outdoor installation for connection to LRC-Charger
	LRC-RC2-CH	Additional portable transmitter with remote control functions
	2 NiMH batteries	2 NiMH batteries for LRC-RC2
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug-cable for connection LRC-Charger to aerial

LRC-Charger-CH

LRC-Small/Opto-CH incl. LRC-Small/Batt

LRC-Small/RC2-CH incl. 2 NiMh batteries

LRC-Charger/Rec Outdoor

Scope of delivery and item description - dead-man systems

Ord. No.	Item	Description
FF013	**LRC-Small/Remote complete**	**Ex-System with dead-man and remote control functions**
	LRC-Small/Remote	Ex-portable transmitter with dead-man and remote control functions
	LRC-Small/Batt	Ex-Battery for LRC-Small/Remote
	LRC-Charger	Charger and Amplifier
	LRC-Charger/REC Outdoor	Aerial-box for outdoor installation for connection to LRC-Charger
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug-cable for connection LRC-Charger to aerial

Ord. No.	Item	Description
FF014	**LRC-Small/RC2 complete**	**System with dead-man and remote control functions**
	LRC-RC2	Portable transmitter with dead-man and remote control functions
	2 NiMH-batteries	2 NiMH-batteries for LRC-RC2
	LRC-Charger	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial-box for outdoor-installation for connection to LRC-Charger
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug-cable for connection LRC-Charger to aerial

Ord. No.	Item	Description
FF015	**LRC-Small/Remote for Aircraft**	**Ex-System with dead-man for aircraft-refueling**
	LRC-Small/Remote/Air	Ex-portable transmitter with dead-man for aircraft-refueling
	LRC-Small/Batt	Ex-Battery for LRC-Small/Remote
	LRC-Charger/Air	Charger and Amplifier
	LRC-Charger/REC Outdoor	Aerial box for outdoor installation for connection to LRC-Charger
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug-cable for connection LRC-Charger to aerial
	Leather-bag with belt for LRC-Remote/Air	

Scope of delivery and item description - TRbF optical-systems for Ship-refuelling

Ord. No.	Item	Description
FF016	**LRC-Small/Ship complete**	**Ex-System with 2 portable transmitters for ship-refuelling**
	LRC-Small/Ship	Ex-portable transmitter with remote-control-functions as per TRbF especially for ships
	LRC-Small/Batt	Ex-Battery for LRC-Small
	LRC-Small/Opto	Ex-portable transmitter with remote-control-functions for optical probes
	LRC-Small/Batt	Ex-Battery for LRC-Small
	LRC-Charger	Charger and amplifier
	LRC-Charger/REC Outdoor	Aerial-box for outdoor installation for connection to LRC-Charger
	18-pin cable 2.5 m	18-pin cable with plug for LRC-Charger, 2.5 m long
	9 m stereo-jack-plug-cable	9 m stereo-jack-plug-cable for connection LRC-Charger to aerial

LRC-Charger-CH

LRC-Small/Opto inkc. LRC-Small/Batt

LRC-Small/Ship incl. LRC-Small/Batt

LRC-Charger/Rec Outdoor

LRC-Charger/Rec outdoor

Scope of delivery and item description - optional components

Ord. No.	Item	Description
DL003	**ANA-Function**	**ANA-Functionality to be activated by LRC-Charger**

ANA-Function optional to items FF001, FF002, and FF003, please order separately!

LDL004 18 meter stereo-jack-plug-cable outdoor (surcharge) — Surcharge for 18 m instead of 9 m (outdoor aerial)

HF001 4 meter stereo-jack-plug-cable — 4 m stereo-jack-plug-cable for indoor-aerial

HF002 9 meter stereo-jack-plug-cable — 9 m stereo-jack-plug-cable for indoor-aerial

HF003 9 meter stereo-jack-plug-cable outdoor — 9 m stereo-jack-plug-cable for outdoor-aerial

HF004 18 meter stereo-jack-plug-cable outdoor — 18 m stereo-jack-plug-cable for outdoor-aerial

HF005 Extension-cable LPG-probe — Connection 3 pins for LPG-probe, spiral-cable (Rest length up to 2 m)

HF006 Extension-cable TRbF-probe (European standard) — Connection 2 pins for TRbF-probe, spiral-cable (spare length up to 2 m)

HF007 Extension-cable optical-probe — Connection 3 pin for optical-probes, spiral-cable (spare length up to 2 m)

HF008 LRC-ADP/10h adapter-cable — Adapter-cable for f.e. floating-probes (Nose 10 h) with integrated ADP-Adapter

HF009 LRC-ADP — Adapter for probes with potential-free output filling=closed, full=open
Can be installed fix at the tank side f. ex.
It is compatible to TRbF-probes (European standard)

Ord. No.	Item	Description
HF010	18-pin cable	18-pin connection cable for LRC-Charger, 2.5 m length, AMP-plug crimped and covered by a shrinkable tube for protection. Leads are numbered.

HF011	18-pin plug and contacts	18-pin AMP-plug with 16 crimp contacts

HF012	Crimp contact	Crimp contact for AMP-plug

HW001	Crimp tool	Crimp tool for AMP-contacts

HF013	Charging angle	Fitting for additional LRC-Small/Remote

HF014	RC2-carrier	Carrier for additional portable transmitter LRC-RC2

HF015	Leather-bag	Leather-bag for LRC-Small or LRC-Small/Remote

Ord. No.	Item	Description
HF016	Leather-bag with belt	Leather-bag for LRC-Small or LRC-Small/Remote and belt

HF017	Leather-bag with belt/Air	Leather-bag for LRC-Small/Remote/Air (Aircraft refueling) and belt

HF018	LRC-Charger/230 V	LRC-Charger with 230 V power-supply for charging the batteries inside the office. The unit can be used also without charger as an alternative unit for the LRC-Charger on the tanker-truck.

HW002	Accufresh	Charger for NiMH-batteries (for LRC-RC2)

HW003	Adhesive tape	1 m for installation of the indoor-aerial LRC-Charger/REC (Adhesive tape is already fixed on the LRC-Charger/REC in series)

HF019	Mounting plate	Mounting plate for LRC-Charger

HF044	LRC-Alarm indicator	This additional micro-switch can be used in the 2 valve configuration to indicate that the LRC-Small has been removed from the LRC-Charger (see chapter C).

Scope of delivery and item Description - Spare Parts

Ord. No.	Item	Description
HF020	LRC-Small (excl. batteries)	Ex-portable transmitter with overfill protection for TRbF-probes and remote control functions (excl. batteries)
HF021	LRC-Small (incl. batteries)	Ex-portable transmitter with overfill protection for TRbF-probes and remote control functions (incl. batteries)
HF022	LRC-Small/Ship (excl. batteries)	Ex-portable transmitter with overfill protection for TRbF-probes and remote control functions - ship-version (excl. batteries)
HF023	LRC-Small/Ship (incl. batteries)	Ex-portable transmitter with overfill protection for TRbF-probes and remote control functions - ship-version (incl. batteries)

HF024	LRC-Small/Gas (excl. batteries)	Ex-portable transmitter with overfill protection for TRbF-probes and remote control functions - LPG-version (excl. batteries)
HF025	LRC-Small/Gas (incl. batteries)	Ex-portable transmitter with overfill protection for TRbF-probes and remote control functions - LPG-version (incl. batteries)

HF026	LRC-Small/Opto (excl. batt.)	Ex-portable transmitter with overfill protection for optical probes and remote control functions, e.g. for ship-refueling (excl. batteries)
HF027	LRC-Small/Opto (incl. batt.)	Ex-portable transmitter with overfill protection for optical probes and remote control functions, e.g. for ship-refuelling (incl. batteries)
HF028	LRC-Small/Opto-CH (excl. batt.)	Ex-portable transmitter with overfill protection for optical probes and remote control functions for Switzerland (excl. batteries)
HF029	LRC-Small/Opto-CH (incl. batt.)	Ex-portable transmitter with overfill protection for optical probes and remote control functions for Switzerland (incl. batteries)

HF030	LRC-Charger	Charger and amplifier (24 V)
HF031	LRC-Charger-CH	Charger and amplifier (24 V) for Switzerland
HF032	LRC-Charger/Air	Charger and amplifier (24 V) for aircraft-refuelling

Ord. No.	Item	Description
HF033	LRC-Small/Remote (excl. batt.) * ... country-specific	Additional Ex-remote control for motor Start/Stop, rotational speed control, fill-stop, ANA*, dead-man* (excl. batteries)
HF034	LRC-Small/Remote (incl. batt.) * ... country-specific	Additional Ex-remote control for motor Start/Stop, rotational speed control, fill-stop, ANA*, dead-man* (incl. batteries)
HF035	LRC-Small/Remote-CH (excl. batt.)	Additional Ex-remote control for rotational speed control (resp. motor Start/Stop) and fill-stop for Switzerland (excl. batteries)
HF036	LRC-Small/Remote-CH (incl. batt.)	Additional Ex-remote control for rotational speed control (resp. motor Start/Stop) and fill-stop for Switzerland (Incl. batteries)

Remark: the remote control can be used as a stand-alone unit or in combination with LRC-Small complete systems

HF037	LRC-Small/Remote/Air (excl. batt.)	Ex-dead-man control for aircraft refueling (excl. batteries)
HF038	LRC-Small/Remote/Air (incl. batt.)	Ex-dead-man control for aircraft refueling (incl. batteries)

HF039	LRC-RC2	Additional remote control for non-Ex-zone incl. 2 rechargeable NiMh batteries
HF040	LRC-RC2-CH	Additional remote control for non-Ex-zone incl. 2 rechargeable NiMh batteries for Switzerland

Remark: the remote control can be used as a stand-alone unit or in combination with LRC-Small complete systems

HF041	LRC-Small/Batt	Intrinsically safe battery-unit for LRC-Small and LRC-Small/Remote

HF042	LRC-Charger/Rec	Indoor-aerial with adhesive-tape for installation on the windscreen

HE043	LRC-Charger/Rec Outdoor	Outdoor-aerial with 9 m cable

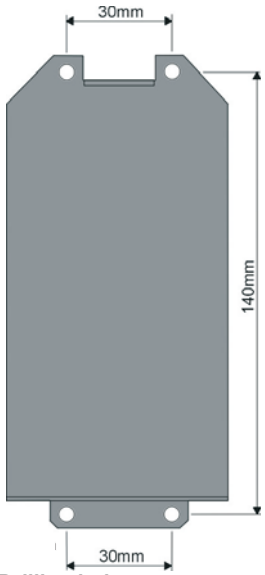
Chapter B

Installation and wiring of the amplifier and the receiving aerial

Installation of the LRC-Charger:

The amplifier is already integrated in the LRC-Charger. This is not approved for the Ex-zone, therefore it has to be installed inside the driving cab or inside the box where the printer is installed resp. inside an external box.
From practical experience a location next to the co-driver´s seat is suitable.

Mounting plate



Drilling holes 5 mm

The LRC-Charger has to be mounted **vertical** or nearly vertical to prevent contact-problems because of vibrations during driving.

The mounting-plate is fixed with 4 screws. Please, take care, that the screws are fixed firmly to resist the vibrations in the tank truck and the mechanical burden on plugging-on and plugging-off the LRC-Small.

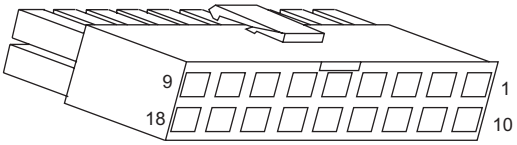
Take into consideration to keep room below the unit to connect the cable and above the unit to plug-in the LRC-Small.

After having built-in the mounting-plate, plug the LRC-Charger with the nose into the hole in the mounting-plate and press the base-part against the mounting-plate. Fix afterwards the LRC-Charger by using the tooth wheel and the M3-screw.

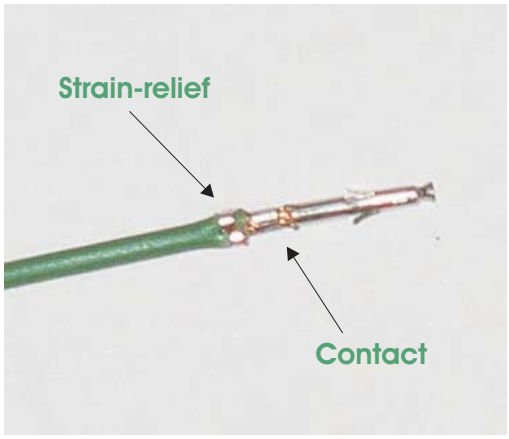
Wiring of the LRC-Charger:

The supplied 18-pin cable is 2.5 m long (special lengths are available on request, the cross-section of each wire is 0.75 mm^2.
Each wire has a number which is identical with the pin-number of the AMP-plug.
A shrinkable tube is mounted on the plug for protection of the connections and strain-relief.

You may use also the 18-pin AMP-plug and crimp the contacts by yourself. In this case we recommend to use also leads with a cross-section of 0.75 - 1mm^2.



Use a suitable crimping tool (e.g. Ord. No. HW001) and take care that the insulation on the back side of the contact is crimped tightly as a strain-relief (see picture below).
It can be additionally soldered but you have to take care that no tin-solder is getting into the contact-area!



Fix a shrinkable sleeve for protection and for strain-relief on the plug!

For detailed pin assignment see chapter C.

Mounting the outdoor antenna LRC-Charger/Rec Outdoor:

Since April 2007 the outdoor antenna is part of the standard delivery. The reason is that we noticed increasing problems with new trucks due to metalized wind screens and sources of electromagnetic disturbances in the driving cabinet. If you want to have an indoor antenna place an order accordingly.
The outdoor antenna is mounted in a waterproof plastics box.
The antenna is inside the box, thus there is no danger of damaging it by touching obstacles like trees.
On the antenna itself there is a 20 cm long cable with a sealed rubber connector. The connection to the LRC-Charger is done with the 9 m stereo-plug-cable (18 m optional).

For mounting the outdoor antenna the lid of the housing has to be removed. The four holes in the corners can be used to mount the antenna box to a mounting plate.
Mount the antenna vertical or horizontal on the topmost position of the tank truck. Do not mount it in between the tank and the driving cabinet, the screening effect of the metal components will reduce the signal strength.

Mounting the indoor antenna for LRC-Charger/Rec (option):

The indoor antenna for the LRC-Charger/Rec is fixed inside of the wind shield of the truck. Remove the protection foil from the double side adhesive on the backside of the antenna box and attach the antenna on the wind shield near to the co-driver on the right side, the antenna pointing downwards.

The antenna has to be kept away at least 25 cm from metal components on the right side to avoid reduction of rf field strength. Mount the antenna box in topmost position so that connecting of the stereo plug is still possible.

The antenna is connected via the 4 m stereo-plug-cable (9 m optional) to the LRC-Charger. Check for tight connection of the plugs on both instruments.

Mounting the carriers for LRC-Small/Remote and LRC-RC2:

If you are using an LRC-Small remote control and an additional remote control you can mount a carrier for it. The carriers can be mounted either directly on the LRC-Charger (see figure) or on another position using the different mounting holes.

Carrier for LRC-Small/Remote: Mounting plate, Ord. No. HF013

Carrier for LRC-RC2: RC2-Carrier, Ord. No. HF014

Mounting plate

Chapter C

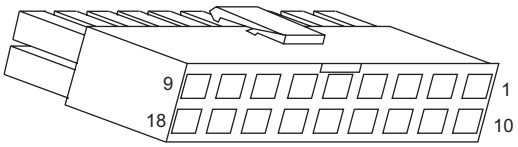
Connection diagrams

Standard application with one magnet valve (also for Germany now)

After the latest software modification (version 4.0) it is possible also in Germany to use the standard circuitry with only one magnet valve. Thus the output pin 15 can be used for an alarm lamp, an additional micro-switch is no more necessary.

In case of Ex-zone approved vehicles install the LRC-Charger outside the Ex-zone and make sure that the connection cable to the valve is installed according to Ex-regulations.

Function	**Pin**	**Connector**	
Release filling	5	output for magnet valve, max. 24 V, 12 W (+24 V = filling)	
	8	Ground for magnet valve	
Stop motor	2	potential-free contact - root	to engine management
	11	potential-free contact - make contact	
	12	potential-free contact - break contact	max. 2 A
Start motor	4	potential-free contact - root	to engine management
	13	potential-free contact - make contact	
	14	potential-free contact - break contact	max. 2 A
Increase engine RPM	9	potential-free contact - make contact	to engine management
	18	potential-free contact - make contact	max. 2 A
Decrease engine RPM	1	potential-free contact - make contact	to engine management
	10	potential-free contact - make contact	max. 2 A
Signal lamp	15	output, active low, max. 24 V, 12 W / 500 mA	
Fixing break	6	Input for detection of the fixing break (ground = break is fixed, open = break is not fixed)	
Bypass input	3	Input for bypass detection (Ground=bypass, open=standard oper.)	
Power supply	7	+24 V power supply	
Power supply	16	Ground	



Normally the electro-pneumatic two/three-way valve for filling release is part of the compressed air system of the main filling valve (f.e. bottom valve), which performs also other safety functions and extra functions for the filling process like counting, metering,..

“**Start Motor**” and “**Stop Motor**” are connected to the engine management system of the truck. The appropriate potential free contact is activated for 2.5 seconds when the according button of the remote control is depressed, independently of how long the button has been pressed. To extend this time press the button again and again within intervals of 1 second.

The functions “Start motor” and “Stop motor” are available only if the input pin 6 is connected to ground. Therefore connect the contact of the fixing break or from the layshaft to this input. Ground potential enables these functions, an open input disables these functions. This is for safety reasons to avoid stopping the engine on the way and to avoid starting the engine with an engaged gear.
If these safety measures are implemented in the engine management connect the input to ground.

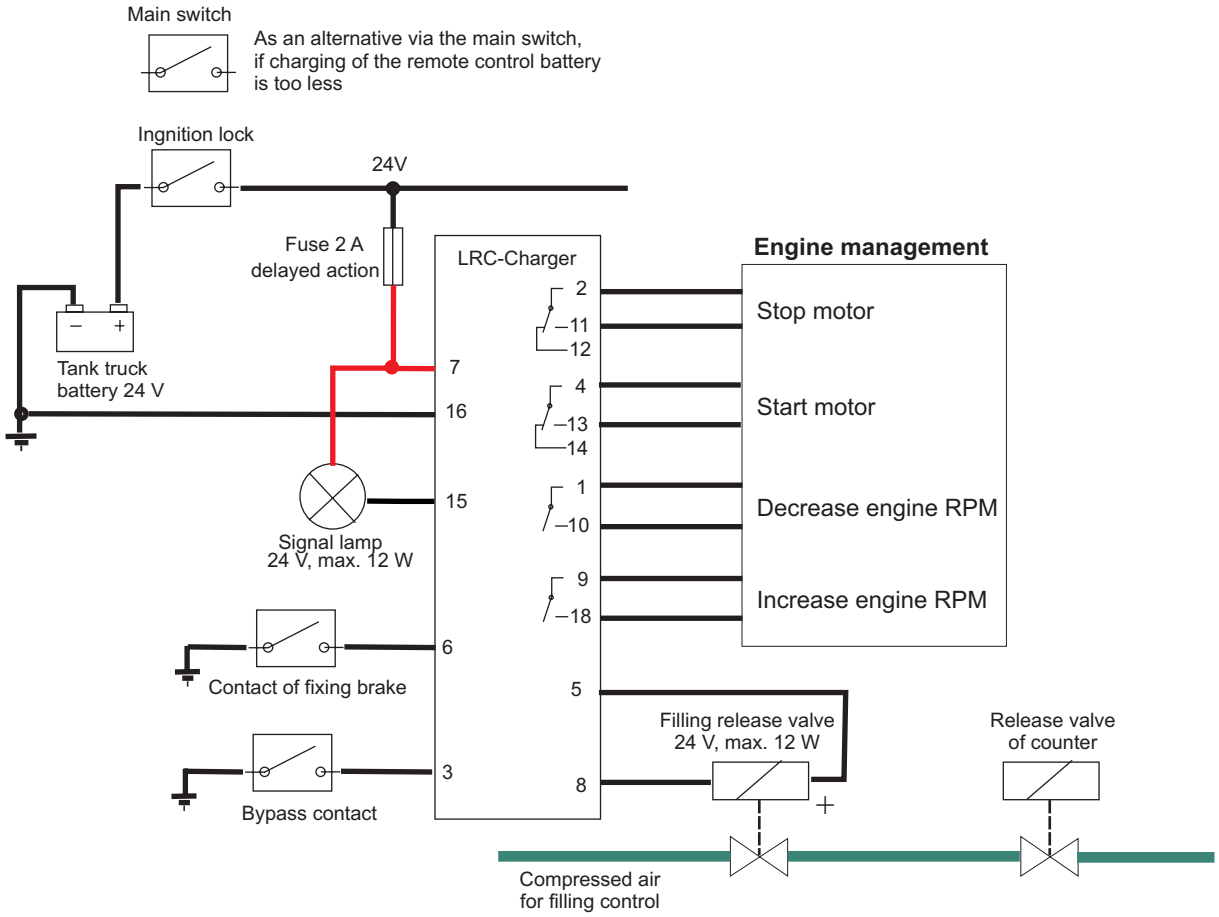
“**Increase engine RPM**” and “**Decrease engine RPM**” are also connected to the engine management of the truck. Of course you can use these outputs for other remote control functions. The outputs are active as long as the associated button is depressed, independent of the status of input pin 6.

Connect a status indicator of the truck dashboard to the output “**Status indicator**” towards +24 V if required.
Caution: It has to be the same +24 V line as connected to pin 7. If pin 7 is open, without +24 V the LRC-Charger can be damaged! This indicator is on if the remote control is not yet inserted into the charger. The idea behind is to avoid that the driver leaves the remote control at the customer.

If you are using a “bypass” technique you should connect the bypass contact to pin 3 of the LRC-Charger. If this one detects a ground potential this instrument does not react any more to radio controlled overfill prevention but reacts to remote control functions - there is a legal regulation in Germany requiring this.

The “**Power supply**” (pin 7 +24 V and pin 16 ground) can be connected to the plus-pole of the ignition. If the user has no possibility to insert the remote control unit into the charging station the power supply should be connected via the main switch or via an additional switch to the on board battery of the vehicle in front of the ignition lock.

Example for connecting a standard installation:



Due to the electronic locking mechanism the magnet valve can be placed after the control blocks also in Germany (software version 4.0 and higher).

If a “bypass” is not available or if you do not want to control it with the LRC-Charger, then leave pin 3 open.

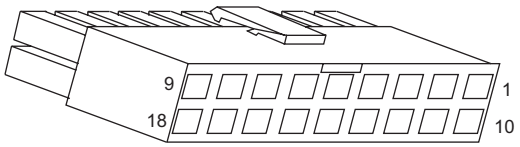
For detailed connections of the engine management electronics of your tank truck see the documentation of the manufacturer.
Please, connect the outputs of the LRC-Charger accordingly.

The LRC-Charger has to be programmed to **operating mode 1** to ensure that the installation operates correctly in the standard mode. Please, see chapter D for details.

Installations with two magnet valves

In case of older software versions or if you want to use the new software with two valves (Germany) the following circuitry can still be used.
If the tank truck is approved for Ex-regulations make sure that the LRC-Charger is mounted outside the Ex-zone and that the connector cable to the valve is installed according to Ex-requirements.

Function	**Pin**	**Connector**	
Filling valve MV1	5	Output for magnet valve, max. 24 V, 12 W / 500 mA,+24 V = filling	
	8	Ground for magnet valve	
Valve MV2	15	Output, active low, for filling interruption, max. 24 V, 12 W	
Stop motor	2	potential-free contact - root	to engine management
	11	potential-free contact - make contact	
	12	potential-free contact - break contact	max. 2 A
Start motor	4	potential-free contact - root	to engine management
	13	potential-free contact - make contact	
	14	potential-free contact - break contact	max. 2 A
Increase engine RPM	9	potential-free contact - make contact	to engine management
	18	potential-free contact - make contact	max. 2 A
Decrease engine RPM	1	potential-free contact - make contact	to engine management
	10	potential-free contact - make contact	max. 2 A
Signal lamp	15	low active output (max. 24 V, 12 W / 500 mA)	
Fixing break	6	Input for detection of the fixing break (ground = break is fixed, open = break is not fixed)	
Bypass input	3	Input for bypass detection (Ground=bypass, open=standard oper.)	
Power supply	7	+24 V power supply	
Power supply	16	Ground	



The electro-pneumatic 2/3-way valve for filling release (MV1) is part of the compressed air control system in front of the control blocks.

The 2/3-way valve MV2 for interrupting the filling is situated behind the control blocks. Define with the operating mode of the LRC-Carger whether the valve is active or inactive during the filling (see chapter D).
Caution: It has to be the same +24 V line as connected to pin 7. If pin 7 is not supplied, without +24 V and +24 V is applied to output MV2 the LRC-Charger can be damaged!

“**Start Motor**” and “**Stop Motor**” are connected to the engine management system of the truck. The appropriate potential free contact is activated for 2.5 seconds when the according button of the remote control is depressed, independently how long the button has been pressed. To extend this time press the button again and again within intervals of 1 second.

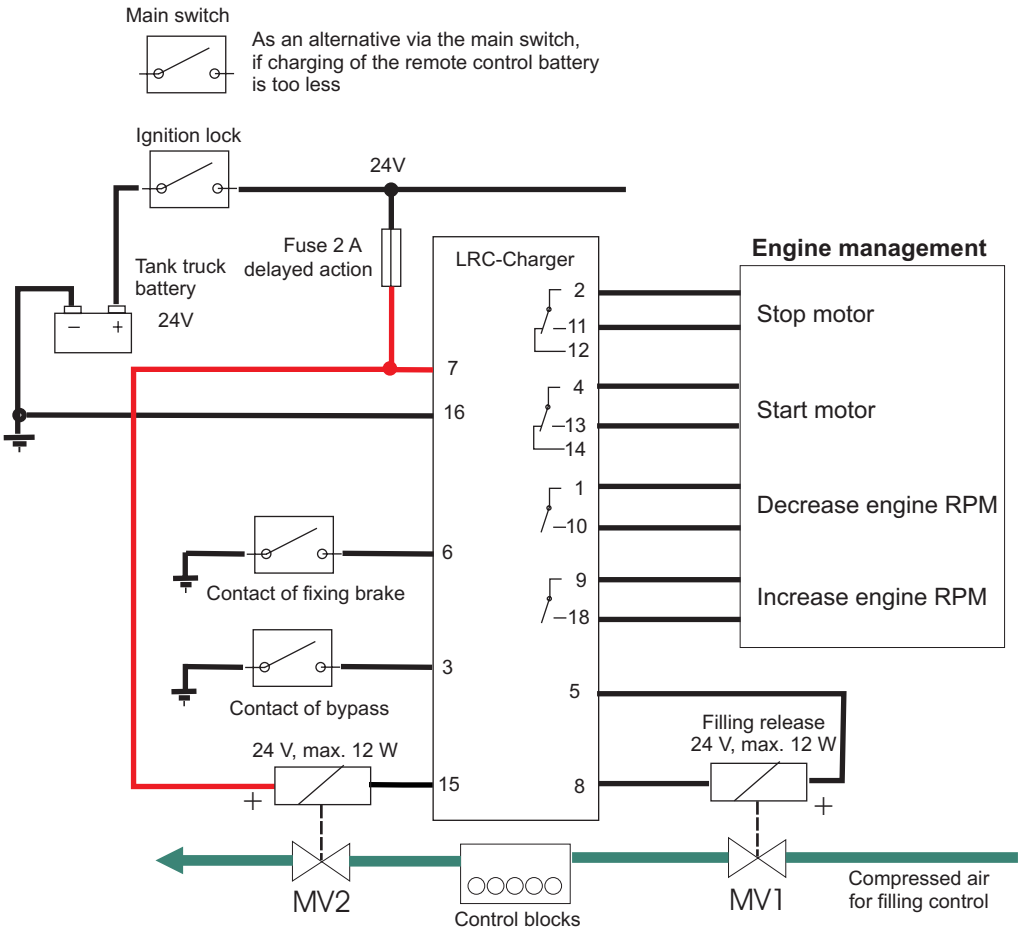
The functions “Start motor” and “Stop motor” are available only if the input pin 6 is connected to ground. Therefore connect the contact of the fixing break or from the layshaft to this input. Ground potential enables these functions, an open input disables these functions. This is for safety reasons to avoid that the driver stops the engine on the way and to avoid the he starts the engine when a gear is engaged.
If these safety measures are implemented in the engine management connect the input to ground.

“**Increase engine RPM**” and “**Decrease engine RPM**” are also connected to the engine management of the truck. Of course you can use these outputs for other remote control functions. The outputs are active as long as the associated button is depressed, independent of the status of input pin 6.

There is a regulation in Germany: During filling with bypass the indicator “Filling” must not be active. This is to avoid that the driver assumes that the overfill prevention system is active. The **“bypass”** feature has been implemented to allow the user to make use of all other functions like filling interruption, motor Start/Stop and speed control (engine RPM). Setting the appropriate mode of the LRC-Charger defines whether the bypass is active or not if the contact is closed (see chapter D).

The “**Power supply**” (pin 7 +24 V and pin 16 ground) can be connected to the positive pole of the ignition. If the user has no possibility to insert the remote control unit into the charging station the power supply should be connected via the main switch or via an additional switch to the on board battery of the vehicle.

Example for connecting a two magnet valve installation:



If there is no bypass available leave connector pin 3 open.

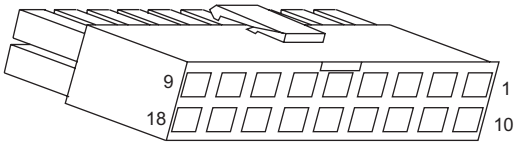
For detailed connections of the engine management electronics of your tank truck see the documentation of the manufacturer. Please, connect the outputs of the LRC-Charger accordingly.

The LRC-Charger has to be programmed to **Operating Mode 2** or **Operating Mode 3**. Please, see chapter D for details.

A “dead-man” installation for fueling airplanes

For fueling airplanes there are legal regulations that the operator keeps continuously depressed a “dead-man’s handle”. To avoid tricking out the system he has to release the button shortly within a distinct time period. There is a red signal lamp mounted on the truck to monitor this functionality.

Function	Pin	Connector
Release filling	5	Output for magnet valve (+24 V = filling is in progress)
	8	Ground for magnet valve
Signal lamp	2	potential-free contact - root max. 2 A
	11	potential-free contact - make contact
	12	potential-free contact - break contact
Power supply	7	+24 V power supply
Power supply	16	Ground

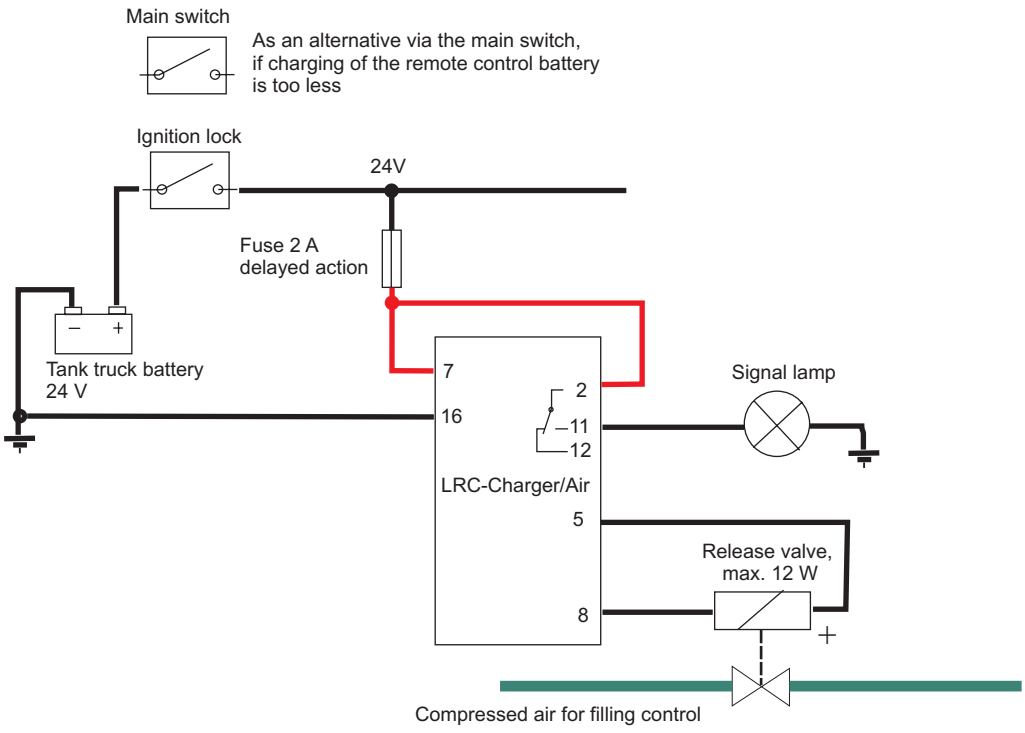


In most cases a 2/3-way valve is used in the compressed air system for filling control.

The signal lamp is permanently on during the filling process and is blinking during the time period the operator has to release shortly the dead-man’s handle.

The “**Power supply**” (pin 7 +24 V and pin 16 ground) can be connected to the positive pole of the ignition. If the user has no possibility to insert the remote control unit into the charging station the power supply should be connected via the main switch or via an additional switch from the on board battery of the vehicle.

Example for an installation for fueling airplanes:

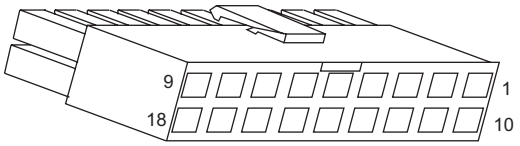


CAUTION: For this application an **LRC-Charger/Air** has to be used!

Fueling installation for Switzerland

In Switzerland three types of tank trucks are currently in use: Tankers with pumps only (valves MV2 and MV3), tankers with gravity discharging (MV1) and tankers with both systems. The appropriate operating mode of the LRC-Charger has to be set by the manufacturer of the tank truck accordingly (see chapter D).

Function	**Pin**	**Connector**	
Release filling MV1	5	Output for magnet valve (+24 V = filling active)	
	8	Ground for all magnet valves (MV1, MV2, and MV3)	
MV2 (pump)	2	potential-free contact - root	max. 2 A
	11	potential-free contact - make contact	
	12	potential-free contact - break contact	
MV3 (pump)	4	potential-free contact - root	max. 2 A
	13	potential-free contact - make contact	
	14	potential-free contact - break contact	
Rem. control output △	9	potential-free contact - make contact	max. 2 A
	18	potential-free contact - make contact	
Rem. control output ▽	1	potential-free contact - make contact	max. 2 A
	10	potential-free contact - make contact	
Horn-output	15	Ground = active (max. 24 V, 12 W / 500 mA)	
Limit switch bottom ESU	6	active = open, inactive = ground	
Limit switch on top ESO	3	active = open, inactive = ground	
Power supply	7	+24 V power supply	
Power supply	16	Ground	



The remote control outputs can be used for any other application.

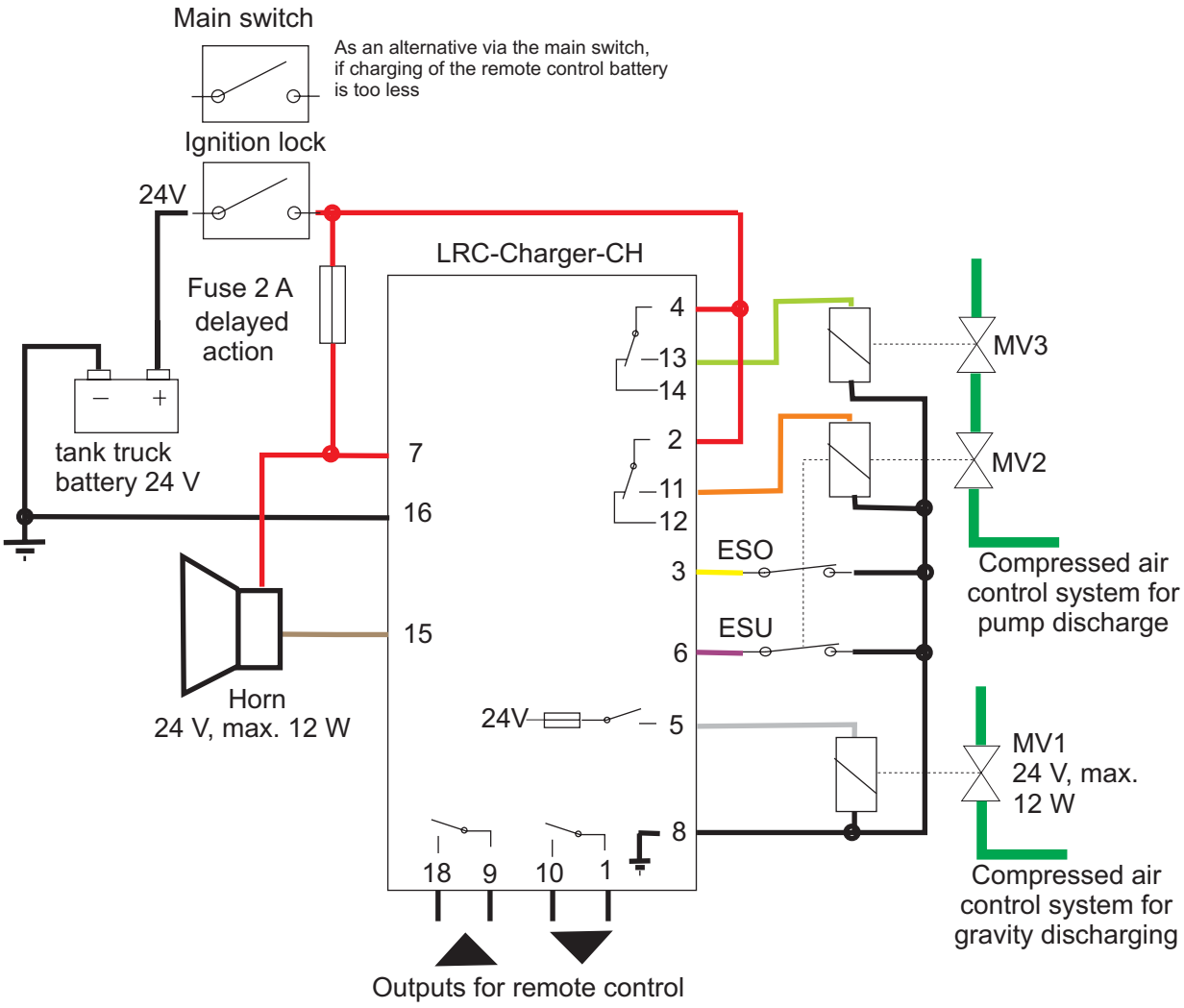
The output "**Horn"** indicates with short audible signals the test sequences for the valve MV2. Additionally the horn signalizes "tank full". Connect one pole of the horn to pin 15, the other one to the +24 V power supply.
Caution: The positive power supply of the horn has to be the same +24 V line as connected to pin 7. If there is no power supply on pin 7 but the horn is connected to +24 V the LRC-Charger can be damaged!

Magnet valve MV1 is used for gravity discharging.

Magnet valves MV2 and MV3 are used for discharging with pumps. MV2 has two limit switches ESU and ESO. Both have break contacts, i.e. they are normally closed and in active condition they are open. The contacts have to be connected to ground.

The "**Power supply**" (pin 7 +24 V and pin 16 ground) can be connected to the positive pole of the ignition. If the user has no possibility to insert the remote control unit into the charging station the power supply should be connected via the main switch or via an additional switch from the on board battery of the vehicle.

Example for a connection of a Swiss installation as per BUWAL:



Chapter D

Configuration, Setup

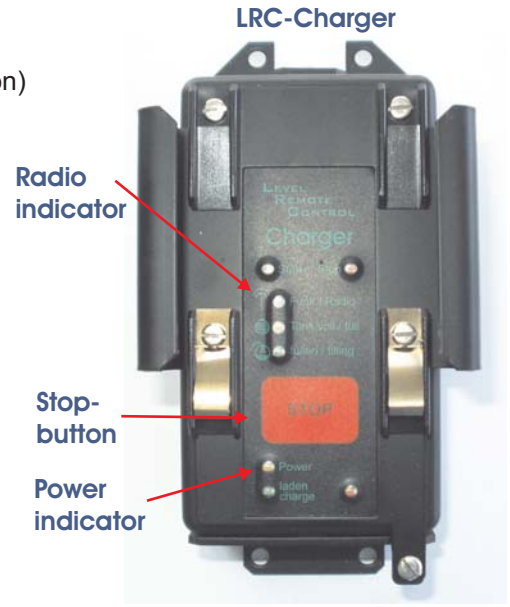
Tuning the handheld transmitters to the LRC-Charger

The LRC-Charger accepts two pre-registered serial numbers of handheld transmitters (remote controls) only to avoid that other transmitters influence the LRC-Charger inadvertently.

The LRC-Charger is able to store 2 serial numbers, one for the overfill prevention device LRC-Small (or LRC-Small/Opto, LRC-Small-CH resp.) and a second one for an additional remote control like LRC-Small/Remote (or LRC-Small/Remote-CH, LRC-Small/Remote/Air, LRC-RC2, LRC-RC2-CH or LRC-Small/Ship respectively).

Normally the instruments are tuned after delivery, but in case of a replacement of an instrument the tuning has to be carried out this way:

- Power up the LRC-Charger (the “Power”- indicator is on)
- Make sure that no LRC-Small is turned on within the receiving area
- Press the “STOP”-button on the LRC-Charger and keep it depressed - after 2 seconds the yellow “Power”-indicator starts blinking
- Press shortly both “↓” and “↑” on the LRC-Small (or on the LRC-Small/Remote or RC-2) to initiate a “START” action. The “Radio”-indicator on the LRC-Charger is on and a continuous beep is issued
- The LRC-Small turns off automatically and a double beep is issued
- Release the “STOP”-button on the LRC-Charger and check for correct function.

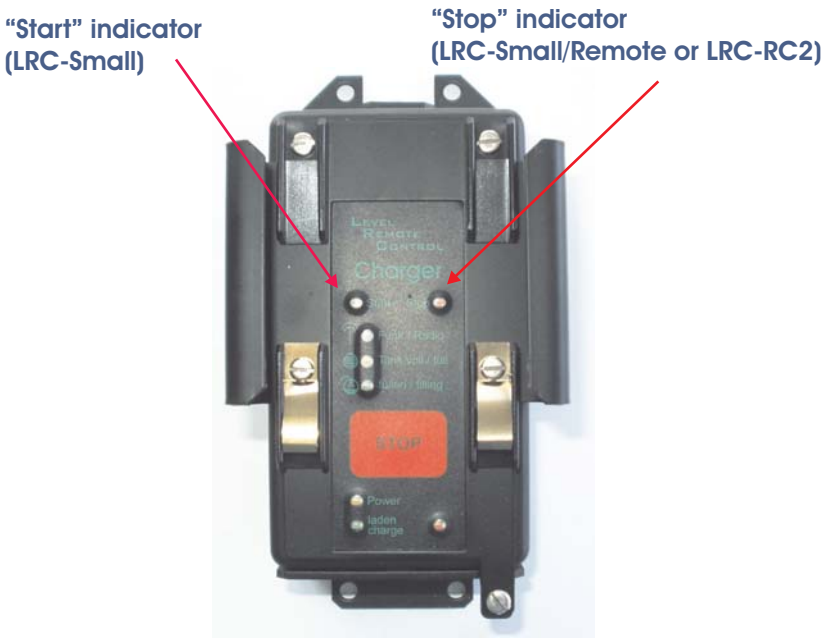


If a new instrument is registered the associated serial number stored in the LRC-Charger is over-written. If a registered instrument is registered again this serial number is deleted in the LRC-Charger. If you did this inadvertently just register the transmitter again in the LRC-Charger.

Checking whether a remote control and/or an extra remote control is tuned with the LRC-Charger:

- Power off the LRC-Charger (the yellow “Power”-indicator is off)
- Keep the “STOP”-button of the LRC-Charger depressed
- Power on the LRC-Charger (the yellow “Power”-indicator goes on)
- Watch the indicators “Start” (green) and “Stop” (red) of the LRC-Charger, they will indicate for approx. 2 seconds which instruments are registered in the LRC-Charger:

Start - green	Stop - red	Instruments registered in the LRC-Charger
off	off	no remote control is registered
on	off	LRC-Small (with probe plug) is registered only
off	on	LRC-Small/Remote (or LRC-RC2) is registered only
on	on	LRC-Small and LRC-Small/Remote (or LRC-RC2) are reg.



Setting the operating mode of the LRC-Charger

As mentioned in chapter C there are different operating modes of the LRC-Charger which define the functionality of the unit:

Mode	Designation	Function of output pin 15	Bypass input pin 3	"STOP"-button of the LRC-Small/Remote
1	Standard	Status, indicates whether the remote control is in the charger **Ground = is not in the charger** Open = inserted in the charger	**Ground = Bypass act.** Open = no bypass	"Stop" the motor, Terminate the filling (MV1)
2	2 magnet valves standard	MV2 - output (valve is behind of the control blocks) **Ground = valve shall open** Open = valve shall close	**Ground = Bypass act.** Open = no bypass	"Stop" the motor Terminate the filling (MV1)
3	2 magnet valves inverse	MV2 - output (valve is behind of the control blocks) **Open = valve shall open** Ground = valve shall close	**Open = Bypass active** Ground = no bypass	"Stop" the motor Terminate the filling process (MV1)
4	TWM-integration	MV2 - output (valve is behind of the control blocks) **Ground = valve shall open** Open = valve shall close	Bypass not possible Pin 3 has a special function	"Stop" the motor Terminate the filling (MV1)

Mode 1: Standard

In the standard-mode the magnet valve output pin 5 is operating as the overfill prevention device. Output pin 15 is an indicator showing whether the remote control is inserted in the charger or not.

In this mode the filling process can be interrupted (i.e. the filling can be stopped and re-started with the remote control provided that the overfill prevention is not active - for version 4.0 and onwards).

If you are using a "Bypass" connect the potential free output of the bypass circuitry to pin 3 of the LRC-Charger and the other contact of the switch to ground. If the contact is closed the "Bypass" is active. If the contact of your appliance has a break contact (open during "Bypass") you have to insert a relay in between for inverting the signal in this mode.

Mode 2: 2 Magnet valves standard

In this mode the output 15 (connecting to ground, active low) is operating as an additional magnet valve output (MV2 behind the control blocks). It is closed when the filling process starts and also MV1-output pin 5 is active. It is open if the filling is stopped (i.e. if the tank is full or if the LRC-Small is turned off).
During the filling process this output can be activated/deactivated with the remote controls LRC-Small/Remote or LRC-RC2 by pressing the "ON/OFF"-button.

If you are using a "Bypass" connect the potential free output of the bypass circuitry to pin 3 of the LRC-Charger and the other contact of the switch to ground. If the contact is closed the "Bypass" is active. If the contact of your appliance has a break contact (open during "Bypass") you have to insert a relay in between for inverting the signal in this mode.

Modus 3: 2 magnet valves, inverse

In many installations the valve MV2 works inverse, i.e. it is open if no electrical signals are applied. In this case also the "Bypass" is inverse, i.e. the contact is open if "Bypass" is active.
Basically this mode is similar to mode 2 but the function of output MV2 and of the bypass input are reversed. In this mode the optional 2 inverter relays can be omitted.

Mode 4: TWM-Integration

This mode is required if you have purchased a Hectronic TWM-LRC Integration System.
Comprehenesive information regarding connections and installation is provided by Hectronic.

Checking the actual operating mode of the LRC-Charger:

- Power off the LRC-Charger (the yellow “Power”-indicator is off)
- Keep the “STOP”-button of the LRC-Charger depressed
- Power on the LRC-Charger (the yellow “Power”-indicator is on)
- Watch the indicators “Charge” (green) and the red one on the right bottom side (approx. 2 s active)

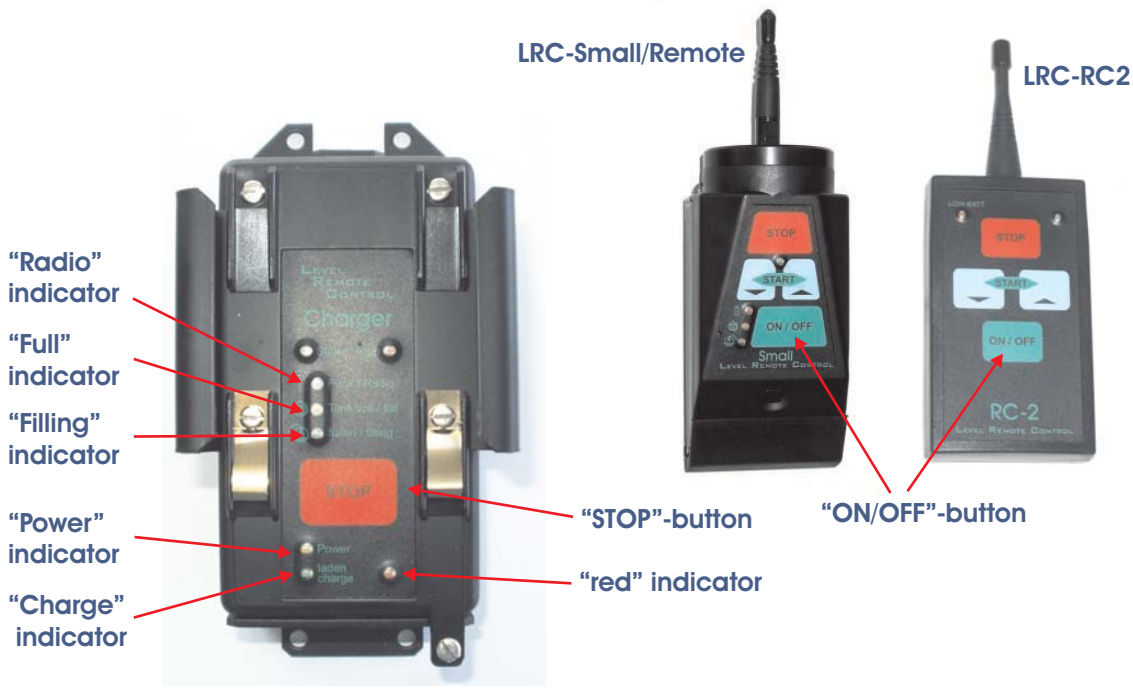
“Charge” (green)	Red, right bottom side	Operating mode
off	off	Mode 1: Standard
on	off	Mode 2: 2 magnet valves standard
off	on	Mode 3: 2 magnet valves inverse
on	on	Mode 4: TWM-integration

Setting the operating mode:

For setting the operating mode of the LRC-Charger an additional remote control like a LRC-Small/Remote or LRC-RC2 is required. It is not necessary to tune this one to the LRC-Charger.

- Power on the LRC-Charger (the yellow “Power”-indicator is on)
- Make sure that there is no remote control turned on within the receiving range
- Keep the “STOP”-button of the LRC-Charger depressed
- After 2 seconds the yellow “Power”-indicator starts to blink
- Press shortly the “ON/OFF”-button of the remote control
- The indicators “Radio” (green), “Full” (yellow) and “Filling” (green) of the LRC-Charger are blinking and the buzzer issues audible signals. The number of beeps signifies the new operating mode
- Release the “STOP”-button of the LRC-Charger

If you want to set another mode repeat this procedure until the required mode is set.



Setting transmitting and receiving frequency range

The LRC system operates in the 433 MHz band. These high technology RF-modules developed by Secu-Tech provide a very narrow bandwidth and an extremely high temperature stability. Thus maximum effective range is achieved even if there are high temperature differences between the remote control and the receiver (e.g. the wall mounted remote control is at -20°C, the receiver is within the air conditioned driving cab of the truck at +25°C).
For enhanced safety the LRC-System uses 2 frequencies in parallel to ensure reliable communication even if one of the frequencies is disturbed.

All LRC-transmitter are working in the same frequency ranges. Due to a special algorithm at least two transmitters can operate in the same receiving area without any interruptions.
If several transmitters shall be used in the same environment (like in terminals) the frequency range of the LRC-systems can be set differently - 16 ranges are supported.
ATTENTION: *On the LRC-RC2 the frequency cannot be changed. Therefore systems which are using an LRC-RC2 have to be set always to standard frequency #1.*

Querying the preset frequency range of the LRC-Charger:

- Power off the LRC-Charger (the yellow “Power”-indicator is off)
- Press and keep depressed the “STOP”-button of the LRC-Charger
- Power on the LRC-Charger (the yellow “Power”-indicator is on)
- Watch the indicators “Radio” (green), “Full” (yellow) and “Filling” (green) of the LRC-Charger and th buzzer. The indicators are blinking, the number of beeps signifies the actual frequency range (1 ..16)

Querying the frequency range of the LRC-Small or LRC-Small/Remote:

- Press and keep depressed the “ON/OFF”-button of the remote control
- The buzzer beeps and the green indicator below the “STOP”-button is on
- Press 3 times shortly the “↑” - button
- Watch the indicators “Radio” (green), “Full” (yellow) and “Filling” (green) of the LRC-Charger and the buzzer. The indicators are blinking, the number of beeps indicates the actual frequency range (1 ..16)
- Release the “ON/OFF”-button

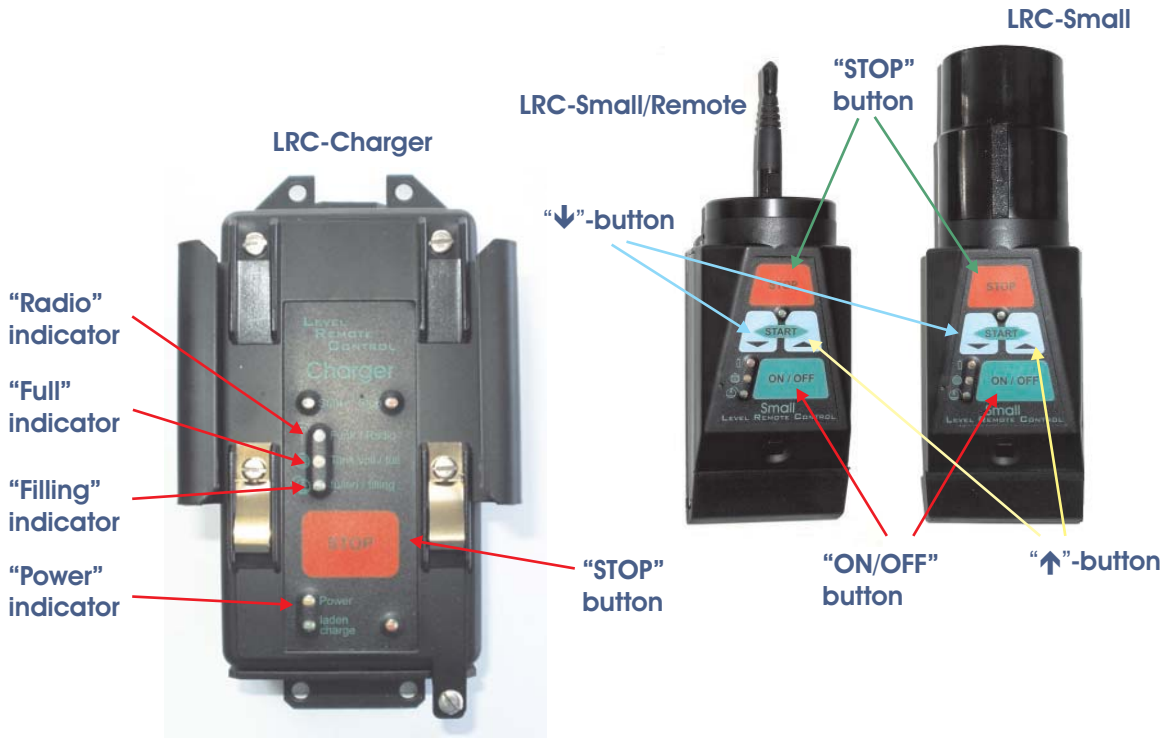
Setting the frequency range of LRC-Small or LRC-Small/Remote and for the LRC-Charger:

- Press and keep depressed the “ON/OFF”-button of the remote control
- The buzzer beeps and the green indicator below the “STOP”-button is on
- Press 3 times shortly the “↑” - button
- Watch the indicators “Radio” (green), “Full” (yellow) and “Filling” (green) of the LRC-Charger and the buzzer. The indicators are blinking, the number of beeps signifies the actual frequency range (1 ..16)
- Select a frequency range with the buttons “↓” or “↑” and wait for the indication of the actual frequency range after each button press before you press again a button
- As soon as you have set the required range press and keep depressed the STOP-button of the remote control - the remote control is programmed now and issues this frequency range continuously via RF - please, keep buttons “ON/OFF” and “STOP” depressed!
- Press and keep depressed the “STOP”-button of the LRC-Charger
- Watch the indicators “Radio” (green), “Full” (yellow) and “Filling” (green) and the buzzer. The indicators are blinking, the number of beeps indicates the actual frequency range (1 ..16)
- Release all buttons now
- Check if the remote control co-operates correctly with LRC-Charger. You can check the frequency ranges of both instruments (see above).

Setting the frequency range with remote controls LRC-Small or LRC-Small/Remote only:

- Press and keep depressed the “ON/OFF”-button of the remote control
- The buzzer beeps and the green indicator below the “STOP”-button is on
- Press 3 times shortly the “↑”-button
- Watch the indicators “Radio” (green), “Full” (yellow) and “Filling” (green) of the LRC-Charger and the buzzer. The indicators are blinking, the number of beeps indicates the actual frequency range of the LRC-Small or LRC-Small/Remote (1 ..16)
- Select a frequency range with the buttons “↓” and “↑” and wait for the indication of the actual frequency range after each button click before you press again a button
- Release the “ON/OFF”-button
- As soon as you have set the required frequency range press “STOP”-button of the remote control - the remote control is programmed now
- Release the “ON/OFF”-button now

Check the programmed frequency of the remote control as described on the previous page.



The frequency range of the LRC-RC2 cannot be modified! This system is operating in the standard frequency range #1 only!

Setting the operating mode in a Swiss installation

As mentioned before in chapter C there are three different operating modes in Swiss installations:

Mode 1: Pump operation only

Mode 2: Gravity discharge only

Mode 3: Pump operation and gravity discharge, selectable

Querying the actual operating mode:

- Turn off the LRC-Small.
- During the whole procedure keep the “ON/OFF“-button depressed.
- Press 3 times shortly the “🡻”-button.
- The 3 indicators on the left side are blinking and the buzzer beeps, the number of beeps indicates the operating mode (1 - 3)

Setting the operating mode:

- Turn off the LRC-Small.
- During the whole procedure keep the “ON/OFF“-button depressed.
- Press 3 times shortly the “🡻”-button.
- The 3 indicators on the left side are blinking and the buzzer beeps, the number of beeps indicates the operating mode (1 - 3)
- Press once the “🡹”-button to increment the operating mode by one, the indication is given again by the buzzer
- If the required operating mode is achieved press the “STOP” button - a short beep will be issued and the LRC-Small is turned off automatically.
- Release the “ON/OFF“-button.The operating mode is stored permanently in the internal Flash-memory.

Note: If you do not want to change the operating mode, do not press the “STOP” button, just release the “ON/OFF“-button.

Chapter E

Description of components and functions

LRC-Small and LRC-Small/Ship

Applications:

Discharging fuel oil, Diesel oil, gasoline
Discharging chemical products
Fueling ships
Fueling tank trucks
Fueling stationary tanks
and many others

Overfill prevention:

LRC-Small is an intrinsic safe handheld remote control with overfill protection and additional remote control functions.
The standard version LRC-Small supports overfill prevention sensors (probe) as per TRbF or EN 13616.
Based on PTC-technology the sensor is kept at a constant temperature, the current consumption increases if the sensor is cooled down by a fluid.

The LRC-Small is attached directly to the probe or used in combination with the extension cable (Ord. No. HF006). The instrument is turned on automatically. If not, it can also be turned on with the “ON/OFF”-button.

First of all the probe is tested, during this procedure (approx. 5 s) the yellow “Full”-indicator of the LRC-Small is on. After successful test the remote control releases the filling action and the green “Filling” indicator is turned on.
As soon as the probe is totally surrounded by the fluid the LRC-Small switches immediately to “Full” condition and the filling is terminated.
If the probe is cooled down by an air stream or by some foam it releases again the filling process.

Depending on the version of the LRC-Small there is a locking mechanism: if the probe is in cool condition for more than 6 seconds the remote control is locked in the “Full” condition and does not release the filling valve any more even if the probe is warmed up again.
This is for safety reasons to avoid that the driver removes the hose because he thinks that the tank is full and releases afterwards the remote control again. For software versions 4.0 and higher it is possible to continue the filling by pressing the ON/OFF-button on the remote control.
In the operating modes 2, 3, or 4 of the LRC-Charger there is no such locking, because in these cases the magnet valve MV1 is in front of the control blocks which perform this locking function.
For petrochemical applications in Germany there is a legal regulation prescribing that the filling release valve is in front of the control blocks. Therefore the control blocks fall off if the probe is cooled down for short periods, thus the safety for the driver is given. It would be troublesome if the LRC-Small would lock too. This is why the locking function in the LRC-Small is inactive for shipments to customers in Germany in the petrochemical industry.

Furthermore a dead-man functionality is not allowed as a replacement for the probes in Germany for petrochemical applications. The dead-man function is therefore locked for such areas of applications.

Dead-man function:

LRC-Small provides two different dead-man functions (except for the petrochemical industry in Germany).
These can be used if no probe is available. The user may select which one is to be used.

1) Dead-man function (standard function)

After activation of this mode the user has to keep depressed the “ON/OFF”-button of the remote control continuously, and from time to time has to release the button within 30 seconds shortly to maintain the filling process. If the button is released for more than 2 seconds the filling is terminated.
In this mode the functions “Start Motor” and “Stop Motor” are not available.

Activation of the dead-man mode:

- Press and keep depressed the “ON/OFF”-button of the remote control
- Press shortly the “↓” - button

If you release the “ON/OFF”-button for more than 2 seconds the filling will be stopped.
Release the “ON/OFF”-button from time to time for less than 2 s and keep it depressed again. The timeout interval for releasing the button is reset to max. 30 s again.
If you keep the button depressed for more than 30 s the remote control will start to beep for max. 10 s and the green indicator below the “STOP”-button will be on. If do not release the button during these 10 s the filling process is stopped.

2) Easy-dead-man mode

After activation of the dead-man mode release the “ON/OFF”-button and from time to time (within 30 s). You have to press it shortly periodically to maintain the filling process.
Press “STOP” to terminate the filling process.
In the Easy-dead-man mode the functions “Start Motor” and “Stop Motor” are not available.

Initiating the Easy-dead-man mode:
- Press and keep depressed the “ON/OFF”-button of the remote control
- Press shortly the “STOP”-button
- Press shortly the “↑”- button
- Press shortly the ”↓”- button
- The remote control beeps six times
- The probe-test is simulated (the yellow “Full”-indicator is on for approx. 3 seconds)
- The green “Filling”-indicator is on and the filling process is released
- Release the “ON/OFF”-button

If you want to stop the filling process press the “STOP”-button.
From time to time press shortly the “ON/OFF”-button. The timeout interval is reset to 30 s again.
If you do not press the button for more than 30 s the remote control will start to beep for 10 s and the green indicator below the “STOP”-button will be on. If you do not press the button within these 10 s the filling will be stopped.

Remote control functions:

The remote control functions can be used during the filling process with overfill protection but also if the portable transmitter is turned off.

Pressing the “STOP”-button transmits a “STOP” code for 2.5 seconds to the LRC-Charger.
If the “Stop Motor” function of the engine management of the tank truck is connected the motor stops.
If a filling was in progress this is also stopped and the remote control is turned off automatically.
Anyway, if you depress the button for 1 s or for 10 s the code is sent for 2.5 seconds. If you want to extend the duration press repetitively the button within 2.5 seconds.

Pressing the “↓”- button and the “↑” -button simultaneously issues a “START”-Code to the LRC-Charger. If the “Start Motor” function of the engine management of the tank truck is connected the motor will be started.
Anyway, if you depress the button for 1 s or for 10 s the code is sent for 2.5 seconds. If you want to extend the function press repetitively the button within 2.5 seconds.

The “↓” - button and the “↑” - button initiate the associated remote control function on the LRC-Charger (normally increasing/decreasing the engine RPM). The function is active as long as the button is kept depressed.

Battery status indication:

The red battery indicator on the LRC-Small is normally off.

If the battery capacity allows an operating time of approx. 1.5 hours the red indicator is blinking slowly.

If approx. 45 minutes operating time are left the red indicator will blink rapidly.

If 10 minutes of operation time are left the red indicator is permanently on.

Automatic turn off of the remote control:

In the “Filling” mode the remote control is turned off automatically after 2 hours.

In the “Full” condition the remote control is turned off automatically after 2 minutes.

In condition “probe-error” the remote control is turned off automatically after 10 seconds.

LRC-Small/Gas

Applications:

Fuelling of liquid gas tanks

The LRC-Small/Gas has the same functionality as the standard LRC-Small (see pages 1 and 2). The difference is that the typical 3-pole liquid gas-probe is integrated into the unit. Thus the remote control can be directly plugged onto the probe.
Additionally there is an extension cable available (Ord. No. HF005).

Functions:

- Overfill protection
- Start Motor
- Stop Motor
- Increase engine RPM
- Decrease engine RPM
- Termination of filling
- Dead/man and Easy-dead-man function

LRC-Small/Opto

Applications:

Discharging of Diesel-oil or fuel oil
Fueling ships

The LRC-Small/Opto has the same functionality as the standard LRC-Small (see pages 1 and 2). This remote control is compatible to optical probes (3-pole) in common use e.g. from manufacturers like Hectronic and Aquasant. A military type 3-pole connector is mounted on the LRC-Small/Opto, thus the remote control can be directly plugged onto the probe-connector without any connection cable. Additionally an extension cable is available (Ord. No.HF007).

The optical probe is tested by the LRC-Small/Opto continuously even during the filling process.

Functions:

- Overfill protection
- Start Motor
- Stop Motor
- Increase engine RPM
- Decrease engine RPM
- Termination of filling
- Dead-man and Easy-dead-man function

LRC-Small/Opto-CH

Applications:

Discharging of Diesel-, fuel oil and gasoline in Switzerland

LRC-Small/Opto-CH is compliant with BUWAL recommendations and therefore the functionality is different from the other LRC-Small versions.
All BUWAL-compliant optical probes are supported e.g. the ones from company Hectronic.

The remote control features 3 operating modes. Set the appropriate one according to the tank truck type during the installation:

1) Pump discharging only
MV2 and MV3 are active, MV2 is controlled by a limit switch (see chapter C)

2) Gravity discharging only, MV1 is active (see chapter C)

3) Pump discharging and gravity discharging in combination

In mode 3 pump discharging is activated as a standard, as soon as the remote control is connected to the probe. Within the first 3 seconds (the yellow “Full”-indicator is on) the user can switch over to gravity discharging by pressing the “STOP”-button.The green indicator below the “STOP”-button is flashing rapidly then.
Turning off the remote control with the “ON/OFF”-button switches back from gravity discharging to pump discharging.

Setting the operating mode:

Turn off the LRC-Small

- During the whole procedure keep the “ON/OFF“-button depressed
- Press 3 times the shortly the “🡻” - button
- The 3 indicators on the left side are blinking and the buzzer beeps - the number of beeps indicates the actual operating mode:
  1 beep: pump discharging only
  2 beeps: gravity discharging only
  3 beeps: combined pump and gravity discharging

.

- A short press on the “🡹” - button switches to the next operating mode, the indication is as described above
- If the required operating mode is selected press the “STOP“-button
- After a short beep the LRC-Small is turned off automatically
- Release the “ON/OFF“-button

The operating mode is set and stored permanently in the internal memory now.

If you do not want to change the operating mode do not press the “STOP“-button, just release the “ON/OFF“-button.

Remote control functions:

The remote control functions can also be used during the filling process with overfill protection, even if the remote control is turned off.

The “🡻” - button and the “🡹” - button carry out the appropriate remote control function on the LRC-Charger. The function remains active as long as the button is kept depressed.

Manual function test of the safety system during the filling process:

According to regulations a function test of the safety system has been implemented in the LRC-system. If the system is in filling status the “STOP“-button on the LRC-Small/Opto-CH can be depressed at any time. In this case the lamp of the optical probe is permanently switched to test mode. This results in a sudden stop of the filling. The yellow “Full”-indicators of the LRC-Small/Opto-CH and on the LRC-Charger-CH start to blink with 1 s period, the horn issues a continuous tone.
If you release the “STOP“-button again, the system starts with the initial tests and the 3 s “Full”-signal.
Note: During this time period you can switch with the “STOP-button to the gravity mode in a combined pump-gravity-system.

Bypass:

On some tank trucks there is a special bypass connector mounted if there is no probe in the tank.
If the remote control is connected to this plug it behaves like a probe within an empty tank.
This mode is in no way an overfill protection - the operator is in this case fully responsible for monitoring the fueling and to avoid overfilling.

Connect the remote control to the bypass connector. The LRC-Small/Opto-CH turns on automatically. If not you can do it manually by pressing the “ON/OFF“-button.
The fueling is started automatically after 3 s. If you are operating a combined pump-gravity-system you can switch within these 3 s to the gravity discharging mode with the “STOP”-button.
Also in the pump discharging mode the valves are not controlled.
The “STOP“-button is not operative during the filling process.
The fueling process is terminated automatically after 20 minutes in the pump discharging mode and after 5 minutes in the gravity discharging mode.

Short interruptions of the filling due to probe wetting and filling locking:

During fueling splashing fluids or foam can activate the probe for short times. The filling stops immediately. If the interruption is very short the LRC-System will continue the filling.
If the interruption is longer than 6 seconds the system locks. The reason is: we have to avoid that the system turns on again after the operator has removed the hose. The filling remains locked even if the probe is deactivated again.
The fueling can be restarted by turning off and on again the LRC-Small.

Indicators of LRC-Small/Opto-CH:

System status	Buzzer	Green indicator below “STOP”	“Battery” indicator red	“Full” indicator yellow	“Filling” indic. green
Filling “Pump“-mode	short every 2.5s	off	-	off	on
Filling “Gravity“-mode	short every 2.5s	blinking 5x per s	-	off	on
Tank full “Pump“-mode	on	off	-	on	off
Tank full “Gravity“-mode	on	blinking 5x per s	-	on	off
Probe lamp-error	1x per second	-	-	blinking 1x per s	off
Bypass “Pump“-mode	short every 2.5s	short every 2.5s	-	off	on
Bypass “Gravity“-mode	short every 2.5s	blinking 5x per s	-	off	on
Battery status Ok	-	-	off	-	-
Battery operation for approx. 1.5 hours	-	-	blinking slowly	-	-
Battery operation for approx. 45 minutes	-	-	blinking rapidly	-	-
Battery operation for approx. 10 minutes	-	-	on	-	-
Remote control buttons	chirping	on	-	-	-

LRC-Small/Remote

Applications:

Dead-man systems for liquid gas fueling and chemical industry
Additional remote control
ANA-transmitter (Germany)
and many others

LRC-Small/Remote is a handheld remote control approved for Ex-zone applications for stand-alone operation together with the LRC-Charger (dead-man system) or as an additional remote control for the standard LRC-Small remote control.

Dead-man function (locked for petrochemical industry in Germany)**:**
ATTENTION: If the LRC-Small is connected to the probe and in operation, the dead-man function of the LRC-Small/Remote must not be used at the same time!

Similar to the LRC-Small also the LRC-Small/Remote provides 2 different dead-man functions.

1) Dead-man (standard function)
After activation of this mode the user has to keep depressed the "ON/OFF"-button of the remote control continuously, and from time to time he has to release the button within 30 seconds shortly to maintain the filling process. If the button is released for more than 2 seconds the filling is terminated.
In this mode the functions "Start Motor" and "Stop Motor" are not available.

Activation of the dead-man mode:

- Press and keep depressed the "ON/OFF"-button of the remote control
- Press shortly the "↓" - button
- Press shortly the "↑" - button
- The remote control beeps three times
- The probe-test is simulated (the yellow "Full"-indicator is on for approx. 3 seconds)
- The green "Filling"-indicator is on and the filling process is released

If you release the "ON/OFF"-button for more than 2 seconds the filling will be stopped.
Release the "ON/OFF"-button from time to time for less then 2 s and then keep it depressed again.
The timeout interval for releasing the button is reset to 30 s again.
If you keep the button depressed for more than 30 s the remote control will start to beep for max. 10 s and the green indicator below the "STOP"-button is on. If do not release the button during these 10 s the filling process will be stopped.

2) Easy-dead-man mode

After activation of the dead-man mode release the "ON/OFF"-button and from time to time (within 30 s) you have to press it shortly to maintain the filling process.
Press the "STOP"-button to terminate the filling process.
In the Easy-dead-man mode the functions "Start Motor" and "Stop Motor" are not available.

Initiating the Easy-dead-man mode:

- Press and keep depressed the "ON/OFF"-button of the remote control
- Press shortly the "STOP"-button
- Press shortly the "↑" - button
- Press shortly the "↓" - button
- The remote control beeps six times
- The probe-test is simulated (the yellow "Full"-indicator is on for appr. 3 seconds)
- The green "Filling"-indicator is on and the filling process is released
- Release the "ON/OFF"-button

If you want to stop the filling process press the "STOP"-button.
From time to time press shortly the "ON/OFF"-button. The timeout interval is reset to 30 s again.
If you do not press the button for more than 30 s the remote control will start to beep for 10 s and the green indicator below the "STOP"-button will be on. If you do not press the button within these 10 s the filling will be stopped.

Remote control functions:

Pressing the “STOP”-button transmits a “STOP” code for 2.5 seconds to the LRC-Charger. If the “Stop Motor” function of the engine management of the tank truck is connected the motor stops. If a filling was in progress it will be interrupted, the release magnet valve MV1 will shut.
Anyway, if you depress the button for 1 s or for 10 s the function is activated for 2.5 seconds. If you want to extend the duration of the function press repetitively the button within 2.5 seconds.

Pressing the “🡻” - button and the “🡹” - button simultaneously a “START”-Code is sent to the LRC-Charger. If the “Start Motor” function of the engine management of the tank truck is connected the motor will be started.
Anyway, if you depress the button for 1 s or for 10 s the code is sent for 2.5 seconds. If you want to extend the function press repetitively the button within 2.5 seconds.

The “🡻” - button and the “🡹” - button initiate the associated remote control function on the LRC-Charger (normally increasing/decreasing the engine RPM). The function is active as long as the button is kept depressed.
Filling interruption in LRC-Charger operating mode 1:
Pressing the ON/OFF-button on the LRC-Small/Remote during an active filling process will change the status of magnet valve MV1: if it was open it will close (filling interruption), if it was shut it will open (filling continues).
Please, wait until the green LED below the “STOP”-button goes off before you press the ON/OFF-button again.

Filling interruption in LRC-Charger operating modes 2, 3, or 4:
Pressing the ON/OFF-button on the LRC-Small/Remote during an active filling process will change the status of magnet valve MV2 (magnet valve after the control blocks): if it was open it will close (filling interruption), if it was shut it will open (filling continues).
Please, wait until the green LED below the “STOP”-button goes off before you press the ON/OFF-button again.

ANA-function (required in Germany for tanks in industrial and commercial environments)**:**

If your LRC-Charger is equipped with the ANA-funktion, you can make use of the ANA-function of the LRC-Small/Remote.

- Switch the LRC-Charger to the ANA-Mode (press 3 times the “STOP”-button of the LRC-Charger)
- The “Start” and the “Stop”indicators of the LRC/Charger are blinking.
- Mount the LRC-Small to the probe
- Press and keep depressed the “ON/OFF”-button of the LRC-Small/Remote
- Press shortly the “STOP”-button of the LRC-Small/Remote
- Release the “ON/OFF”-button - the LRC-Small/Remote issues periodically double beeps

You have to press the “ON/OFF”-button within 30 seconds again to extend the ANA-time again to 30 seconds. If not the green indicator below the “STOP”-button is on and the buzzer issues tones. Within 10 seconds you have press the “ON/OFF”-button to maintain the filling.
You can stop the filling at any time by pressing the “STOP”-button of the LRC-Small/Remote.

Battery status indication:

The red battery indicator on the LRC-Small is normally off.

If the battery capacity allows an operating time of approx. 1.5 hours only the red indicator is blinking slowly.

If approx. 45 minutes of operating time are left the red indicator will start to blink rapidly.

If 10 minutes operation time are left the red indicator is permanently on.

The LRC-Small/Remote is optimized for very low energy consumption. Normally it is sufficient to connect it once per week to the LRC-Charger for re-charging the batteries

LRC-RC2

Applications:

Dead-man systems
Additional remote control
ANA-remote control (Germany)
and many others

LRC-RC2 an intrinsically safe version of the LRC-Small/Remote not approved for Ex-zone applications. The functionality is identical to the LRC-Small/Remote (see section LRC-Small/Remote in this document).
Difference between the two instruments:

	LRC-RC2	LRC-Small/Remote
Applicable for Ex-zone	no	yes
Battery	2x NiMh-batt (AA)	LRC-Small/Batt
Indicators: Filling/Full	no	yes
Buzzer	no	yes
Transmitter-frequency	fix in 1 range	Ranges 1 to 16
Weight incl. battery	152 g	485 g

The batteries can be recharged with a commercial NiMh - chargers.
The charger “Accufresh” is available as an option (Ord. No. LZ 003).

LRC-Small/Remote-CH

Applications:

Additional remote control for LRC-Systems in Switzerland

LRC-Small/Remote-CH is the intrinsically safe additional remote control for Swiss systems (LRC-Small-CH complete) approved for Ex-zone applications.
Due to the special functions of the Swiss system the following functions can be used:

- Remote control functions “🡻” and “🡹”
- Termination of filling with the “ON/OFF”-button

LRC-RC2-CH

Applications:

Additional remote control for LRC-systems in Switzerland

LRC-RC2-CH is a variant of the LRC-Small/Remote-CH but is not applicable in Ex-zones, the functionality is identical.

LRC-Small/Remote/Air

Applications:

Dead-man systems for aeroplane fueling

LRC-Small/Remote/Air is a remote control for fueling airplanes featuring a dead-man function. It is approved for Ex-zone applications. The ergonomic handle ensures comfortable operation.

Dead-man function:

- Press 3 times the button on the handle of the LRC-Small/Remote/Air. After the third press keep it depressed. *)
- The remote control is turned on and the yellow indicator is on for 3 seconds (this is for safety reasons - during this time period the filling is not yet in progress!)
- The filling is released and the signal lamp on the tank truck is on permanently.
- To stop the filling release the button on the handle.
- Each time after 2.5 minutes of filling the signal lamp starts blinking. Then you have to release shortly the button on the handle within 30 seconds, then keep it depressed again to maintain the filling.
- If you release the button during the time when the signal lamp is still permanently on and press it again then the 2.5 minute interval is started anew. Thus you do not have to watch the signal lamp.

*) The time interval for turning on the LRC-Small with 3 button presses is strictly limited to avoid inadvertent turning on. This is why it needs some training for beginners.

LRC-Small/Batt

This Ex-zone approved battery is applicable for all LRC-Small remote controls and also for all LRC-Small/Remote instruments.
This battery-pack can be replaced directly in the Ex-Zone.

The capacity is 2700 mAh with 5 cells, a new battery provides up to 20 hours of fueling time (LRC-Small on a probe). A one year old heavily used battery still provides 12 to 18 hours.

It takes approx. 2.5 hours to fully recharge a totally empty battery with the LRC-Charger.

LRC-Charger

The LRC-Charger combines a charging equipment for batteries LRC-Small/Batt, and also a booster for overfill prevention, a remote control receiver and the ANA-System (please, add “ANA” to your orders if it is required).

Battery charger:

It is intelligent charging module evaluating many parameters and measured values to provide quick charging and to ensure best lifetime of the batteries.
There are nearly no chargers on the market which can charge at very low temperatures - LRC-Charger can do this also at minus degrees.
There is no memory effect.
Cells which seem to be defective are refreshed again.
A totally discharged battery is re-charged within 5 minutes to a capacity providing 50 minutes fueling monitored with a probe.
A totally empty battery is charged fully in approx. 2.5 hours.

The batteries can also be charged during the filling process.

Indication of charging status with the green charging indicator:

Battery capacity below 70%	blinking rapidly
Battery capacity more than 70%	blinking slowly
Battery full	permanently on

Fault indication: If the red indicator in the right bottom is permanently on there has been an error detected in the battery module (e.g. if the battery is totally discharged). In this case the LRC-Charger charges with a small current. After 5 minutes the test is carried out again. If the red indicator goes off everything is ok, if not, the battery is defective. Remove the battery from the charger and insert it again for a second trial.

Overfill prevention:

Pin 5 of the LRC-Charger is the output for the overfill protection. Internally the instrument consists of 2 independent modules. Each of them evaluates the remote control signals and acts on a relay for filling release. These two internal relays are connected in series and then to pin 5. As soon as both safety modules are ready for filling +24 V are applied to pin 5.

If the LRC-Charger receives an RF-signal from a registered remote control the green “Radio”-indicator is on.
If a “start filling” command is received and is accepted the magnet valve output pin 5 is connected to +24 V and the green “Filling”-indicator is on. In operating modes 2, 3, or 4 (see chapter C) additionally the output pin 15 is controlled for the magnet valve MV2 (on for modes 2 and 4 or off for mode 3).

The filling will not be started if:

- the LRC-Charger is turned on and there is already a filling signal sent from the remote control
- there has been a radio interruption for more than 6 seconds during a filling process (mode 1 only)

In these cases the remote control LRC-Small has to be restarted again.

Terminating a filling process:

There are different ways to stop a filling depending on the operating mode.

Operating modes 2, 3, or 4:

If your installation is equipped with 2 release valves (before and behind the control blocks), you can stop and continue the filling anytime:

- ”ON/OFF”-button on the LRC-Small/Remote or LRC-RC2 (MV2 is switched, MV1 stays open)

The filling process can be stopped anytime (MV1 will closed and the control blocks will go off) with:

- ”STOP”-button on LRC-Small/Remote or LRC-RC2 (MV1, MV2 will close, the motor stops)
- ”STOP”-button on LRC-Small (MV1, MV2 will close, the motor stops)
- ”ON/OFF”-button on LRC-Small (MV1, MV2 are closed)
- Remove the LRC-Small from the probe (MV1, MV2 will close)
- ”STOP”-button on LRC-Charger (MV1, MV2 will close, the motor stops)

Operating mode 1:

- ”ON/OFF”-button on LRC-Small/Remote or LRC-RC2 (MV1 will close), the filling can be continued by pressing again the ON/OFF-button provided that the limit indicator is not wet
- ”STOP”-button on LRC-Small (MV1 will close, the motor stops)
- ”ON/OFF”-button on LRC-Small (MV1 will close)
- Remove the LRC-Small from the probe (MV1 will close)
- ”STOP”-button on LRC-Charger (MV1 will close, the motor stops)

Remote control functions:

Start Motor, Stop Motor:

To avoid that the driver inadvertently stops the engine on the way, or that he starts the engine when a gear is engaged the functions “Start Motor” and “Stop Motor” are controlled via the input pin 6. If this input is connected to ground, these functions can be used, if pin 6 is open they are locked.
Therefore connect this input to the contact of the fixing brake or to the contact of the layshaft.
If the engine management is prepared for these events connect the input to ground.

The potential-free contacts are active for 2.5 seconds, independent of how long the button of the remote control has been pressed.
Exception: If the user presses the button several times e.g. every second. Thus the duration of the function is increased by 2.5 s each time.

Remote control outputs “🡻” and “🡹” (e.g. for controlling the engine RPM):

These functions can be initiated independently of the input pin 6. They remain active as long as the button of the remote control is depressed. They are potential-free “make contacts”.

ANA-Funktion:

In Germany the ANA (Aufmerksamkeits-Not-Aus) function is prescribed if tanks are fueled in industrial or commercial environments.
If this function is required please add this item to your orders (Ord. No. DL003).

Before you connect the LRC-Small to the probe, press 3 times shortly the “STOP”-button of the LRC-Charger. The indicators “Start” and “Stop” start blinking to indicate the ANA-Mode. The ANA-mode remains active until you press this button 3 times again, even if the power supply of the LRC-Charger has been turned off in between.

Now plug the LRC-Small on to the probe and start the ANA-Function on LRC-Small/Remote or LRC-RC2 (keep ”ON/OFF” depressed and press shortly the “STOP”-button).
As long as the filling process should be maintained press shortly within 30 seconds the “ON/OFF”-button of the additional remote control. If you want to stop the filling press “STOP” of the additional remote control.
If the LRC-Charger does not receive ANA-signals any more from the remote control the filling is stopped after max. 30 seconds.

Bypass mode (for LRC-Charger software versions 3.1 and higher)**:**

If input pin 3 is connected to ground in operating modes 1 or 2, or if input pin 3 is open in operating mode 3 the LRC-Charger is operating in the Bypass-mode.
If the tanker is discharging in the Bypass-mode there is a German regulation prescribing that the overfill protection must not be active in this mode.
If the LRC-Charger is in the Bypass-mode it activates automatically the MV2-output on pin 15 (in operating modes 2, 3, or 4 only), magnet valve Mv1 and the “Filling”-indicator of the LRC-Charger are not in use, even if the LRC-Small is connected to a probe of an empty tank.
All other functions like: Start/Stop motor, control engine RPM, or filling interruption are still operative.
The Bypass-mode is indicated by rapid synchronous blinking of the “Power”- and “Filling”-indicators.

Indicator for “Remote control not in charger”:

The output pin 15 is a low-active FET-output. In operating modes 2, 3, or 4 connect magnet valve MV2 to this output.

In operating mode 1 connect for example an indicator lamp of the truck dashboard. This will be on if LRC-Small is removed from the charger. The idea is to avoid that the operator leaves the LRC-Small on the probe or at the customer.

CAUTION: Ensure that the device connected to pin 15 (lamp or magnet valve) is not connected to a positive power supply that might be on if the power supply of the LRC-Charger (pin 7) is turned off! In this case the LRC-Charger would be supplied via pin 15 and could be damaged!

Indicators of the Charger:

“Start” - green:
ON: Start-function is active
Blinking together with “Stop”: ANA-function is active

“Stop” -red:
ON: Stop-function is active
Blinking together with “Start”: ANA-function is active

“Radio” - green:
ON: Receiving radio signals from a registered remote control

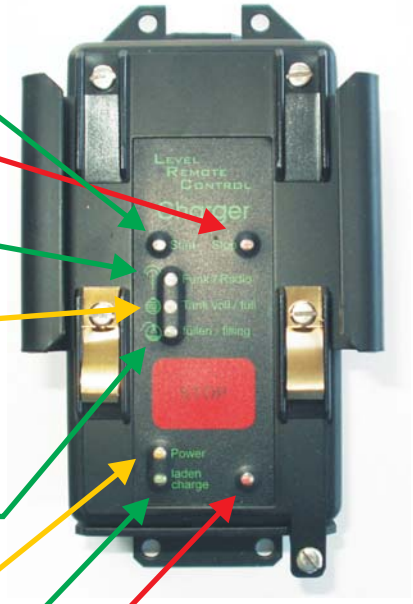
“Full” - yellow:
ON: Tank is full or probe-test
Blinking while LRC-Small is on: probe-error
Blinking while LRC-Small is off: internal error in the LRC-Charger (power off and on again. If the problem remains send instrument to service facility)

“Filling” - green:
ON: Output MV1 (pin 5) is at +24 V

“Power” - yellow:
ON: Power supply of the LRC-Charger is on
Blinking: programming mode (see chapter D)
Blinking together with “Charge”: Bypass-mode

“Charge” - green:
ON: battery is charged completely
Blinking slowly: battery >70%
Blinking rapidly: battery <70%
Blinking together with “Power”: Bypass-mode

Red indicator below “STOP”-button:
ON: battery error
Blinking: Error on connection cable to antenna box



LRC-Charger/CH

The LRC-Charger/CH is in compliance with the requirements of BUWAL, therefore some functions are different to the standard LRC-Charger.

Functions:

- Overfill prevention for gravity discharging (MV1) on pin 5
- Overfill prevention for pump-discharging (MV2) instead of “Stop motor”
- Overfill prevention for pump-discharging (MV3) instead of “Start motor”
- Test input for MV2, bottom limit switch (ESU) on pin 6
- Test input for MV2, top limit switch (ESO) on pin 3
- Horn output on pin 15 (active low)
- Remote control outputs “↓” and “↑” for e.g. engine RPM control or Start/Stop Motor
- Charger for LRC-Small/Batt

For pump-discharging two magnet valves are controlled. MV3 is continuously on during the whole filling, magnet valve MV2 is controlled via the limit switches ESU and ESO and monitored permanently. I.e. during the filling process the valve is periodically closed a little and opened again. If an error occurs (e.g. limit switches are not in correct position) the filling is stopped and the yellow “Full”-indicator of the LRC-Charger/CH is blinking.
If the limit switch position is correct afterwards, the filling can be continued by turning off and on again the LRC-Small/CH (or by removing it from the probe and reconnecting it).

The horn issues a permanent signal for the following conditions:

- Tank full
- Lamp of the probe is defective
- Valve MV2 error

Additionally for each MV2-test a short audible signal is issued.

The horn is turned off by:

- Turning off the power supply of the LRC-Charger
- Turning off the LRC-Small

For detailed description of the standard functions see the section LRC-Charger in this document.

LRC-Charger/Air

The LRC-Charger/Air is the charging unit and the remote control receiver for the dead-man system for fueling airplanes.

Functions:

- Magnet valve output for releasing the filling process on pin 5
- Signal lamp instead of “Stop Motor”
- Charger for LRC-Small/Batt

LRC-Charger/REC-outdoor (included)

LRC-Charger/Rec Outdoor is the outdoor version of the antenna box. There is no antenna outside the box (the antenna is integrated in the box).
Using the outdoor version the effective range can be increased depending on the mounting location. This version is splash-water proof.

Out of the box there is an approx. 20 cm long connector cable with a 4-pole water-protected rubber-type connector. The connection to the LRC-Charger is done with a 9 m or 18 m long cable.

LRC-Charger/REC (option)

LRC-Charger/Rec is an antenna-box with integrated receiver. It is designed for indoor usage only (see chapter B).
LRC-Charger/Rec has been developed also by Secu-Tech. The receiver provides a very narrow bandwidth for best noise insensitivity and high signal sensitivity for optimal effective range, on the other hand it provides highest temperature stability. There is no impact on the effective range for temperature changes up to 60°C (e.g. LRC-Small wall-mounted, environment temperature: -30°C, antenna box mounted in the driving cab, temperature: +30°C). Such temperature insensitive modules are normally available for military applications and are very expensive.

The connection to the LRC-Charger is done by a two-pole shielded cable with a stereo-plug with 4 m or 9 m length.

Chapter F

Trouble-shooting and Application hints

Trouble-shooting the radio data transmission:

How to find out radio transmission problems:

Position yourself in front of the LRC-Charger and connect a mobile probe to the LRC-Small.

A) the “Radio”-indicator of the LRC-Charger is on now (the radio frequency connection is established):

Move away from the LRC-Charger. One of your colleagues should watch the “Radio”-indicator of the LRC-Charger if possible.
If the radio transmission is correct it should be possible to move away several hundred meters in an open area without any loss of radio communication. If the connection is interrupted for example at a distance of 40 m then there is a radio transmission problem.

B) the “Radio”-indicator of the LRC-Charger is off and the red indicator on the bottom right side of the LRC-Charger is blinking:

The connection between the LRC-Charger and the LRC-Charger/Rec is not established correctly. Check the connectors and the cables between the two instruments.
A cable can be interrupted or a short circuit has occurred by squeezing the cable.

C) the “Radio”-indicator of the LRC-Charger is off, the “Power”-indicator is on:

Try again to tune the LRC-Small to the LRC-Charger (see chapter D for details).
If you do not succeed and if the “Radio”-indicator is not on during the tuning procedure also it can be assumed that the connection between the LRC-Charger and the LRC-Charger/Rec is defective.

You noticed that the effective range of one remote control is sufficient but the effective range of another one is too less:

In this case there is a problem with the radio frequency module or in the internal connection of the antenna of the handheld remote control. Please, send in this remote control to service department for repair.

You have noticed that both remote controls have insufficient effective range:

With high probability the problem is related to the antenna box LRC-Charger/Rec.

The driver complains about filling interruptions, but the effective range is tested to be sufficient:

Maybe there is loose contact on the connectors of the LRC-Charger. The vibrations of the running truck engine can produce filling interruptions then. Shake a little the 18-pole AMP-connector on the LRC-Charger during operation to locate or verify the fault.
The real reason might be a bad connection of the cable to the crimp-contact or a broken wire. Another reason: the crimp contact is not locked tightly in the connector housing and has moved backwards.

The LRC-Charger does not respond to the remote control:

The yellow “Full”-indicator of the LRC-Charger is blinking:

An internal error in the LRC-Charger has been detected. For example, if one of the relay contacts of the two safety channels got stuck. Power off and on again the LRC-Charger.
If the problem remains, please, send in the LRC-Charger to a service facility for repair.

The yellow “Power”-indicator and the green “Filling”-indicator are blinking:

The LRC-Charger is operating in the Bypass-mode. Verify, whether the Bypass mode has been activated or not. If not, check if pin 3 is connected to ground (in operating modes 1, 2 and 4 ground potential activates the Bypass mode, in operating mode 3 “open condition” activates the Bypass mode).

The yellow “Power”-indicator is off:

Check the power supply on pin 7 (+24 V) and pin 16 (ground).

The yellow “Power”-indicator is on but the radio connection cannot be established:

Check if the remote control is registered and verify the radio connection (see above).

The remote control LRC-Small does not start the filling:

You are connecting the remote control to the probe and it does not turn on:

Some probes do not support the automatic turn on. Therefore turn on the LRC-Small with the “ON/OFF”-button. If this does not work either the battery is discharged completely or the remote control unit is defective.

The remote control turns on, but only the “Full”-indicator is on:

Maybe the probe is defective. If the remote control behaves in the same way if you turn it on with the “ON/OFF”-button and no probe is connected than the LRC-Small is defective - in this condition the “Full”-indicator should be blinking.

Turn on the LRC-Small with the “ON/OFF”-button, the green indicator below the “STOP”-button is on for appr. 5 seconds, the remote control turns off again:

This happens if an internal contact problem in the LRC-Small has been detected.
Please, send in the instrument to a service facility for repair.

The remote control turns on but only the yellow “Full”-indicator is blinking:

The probe is defective. Please, test again with another probe.

Troubles with the battery:

The battery has a loose contact, the remote control turns off if you hold it in your hands:

Sometimes the battery itself is not mounted firmly, or there is a crack in the housing.
This could cause such problems.
This can be remedied easily in the service department of Secu-Tech.

The red indicator on the charger always goes on if the battery is inserted:

There is a checksum error in the battery module or the memory could not be read.
Leave the battery in the charger for appr. 10 minutes. If the red indicator is still on there is a permanent problem: maybe the battery is at the end of its life cycle or the internal memory is corrupt (this can be solved in the service department of Secu-Tech easily).

The side wall of the battery compartment is broken:

This could happen sometimes if the battery is taken out of the charger by force using a lever. Sine 2006 all batteries are delivered with enhanced sidewalls and this problem will no more occur again.
If you have an older version of the battery compartment and if the side wall is broken this can be fixed easily with an adhesive like Loctite or similar products. Please, ensure that no adhesive gets into the side guides of the battery, so that the battery will still fit perfectly to the LRC-Small. If you do not want to do this by yourself you are welcome to send it in to Secu-Tech.

Application notes

The filling shall start only when the “ON/OFF”-button of the remote control is depressed:

In case of a 2 magnet valve installation (operating modes 2, 3 or 4) some customers do not want to start the filling immediately. They want that the driver is close to the tank in the cellar, and after he has checked everything then he shall press the “ON/OFF”-button of the LRC-Small/Remote or LRC-RC2 to initiate the filling.
This can be achieved by the following procedure:

Operating modes 2, 3, or 4:

Connect an inverter relay to the output MV2, i.e. if the output is active the contact is opened (break contact).

Operating mode 2:

You may program the LRC-Charger to operating mode 3 (Caution: the Bypass mode is inverted too).

Operating mode 3:

Set the LRC-Charger to operating mode 2 (Caution: the Bypass mode is inverted too).