



LineTroll[®] R110C

**GSM communication unit for LineTroll 110E μ R
phase-mounted fault indicator**

User Manual

LineTroll[®]



This document describes the Installation-, configuration and use of LineTroll R110C

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© 2013 NORTROLL AS
P.O.Box 133
7601 Levanger
Norway
www.nortroll.no



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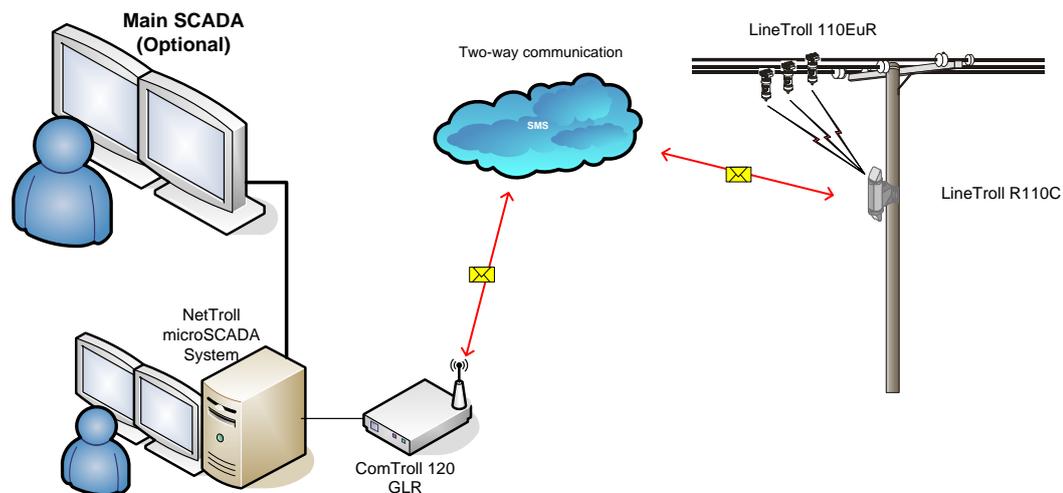
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System overview

The LineTroll R110C is a pole mounted device for communication between NetTroll microSCADA System and LineTroll 110 μ R fault passage indicators.

LineTroll R110C uses a 2.4GHZ, ISM band radio to communicate with up to 9 fault indicators in the range of up to 40m. The alarm messages from the fault indicators are transported to the SCADA system using Short Message Service (SMS) through the GSM network.



The LineTroll R110C can be described as a data-collector for fault indicators and will in this document also be referred to as «*Collector*».

Available versions

The LineTroll R110C comes with a built-in SMS modem as standard. Alternative models are:

Relay output option:

This version has no GSM modem. Instead alarms can be sent using any third party RTU through a relay interface.

The functionality is the same as for all other versions. The relay card has one relay output (NO) for the following messages/alarms:

- ✓ Permanent Fault
- ✓ Transient Fault
- ✓ Loss of voltage
- ✓ Low Battery in indicators
- ✓ Low Battery in Collector
- ✓ Faulty communication with indicator(s)

GPRS /DNP3 Option

The on-board SMS modem is exchanged with a GPRS module with DNP3 protocol for direct connection to SCADA systems. This modem has also SMS messaging where GPRS is made difficult do to network limitations.

The collector itself has the same functionalities as described in this document.

Details about usage, setup and commissioning is found in separate documentation for the GPRS/DNP3 modem.

LineTroll R110C can:

- ✓ Forward fault alarms from the phase-mounted indicators:
 - Transient Fault
 - Permanent Fault
 - Loss of voltage
 - Low Battery warning from Indicators
- ✓ Configure, test and reset indicators from either NetTroll FDP or a handheld unit (FDP-20).
- ✓ Continuously monitor communication link between the collector and all indicators and report errors.
- ✓ Monitor signal level and report Low Battery Warning in the Collector.

Technical description

LineTroll R110C can be setup to communicate with 3, 6 or 9 indicators within the communication range. This opens for the possibility to mount fault indicators on parallel feeders or in poles with multiple circuits using only one Collector. It will also give a cost-effective setup in T-off's and branches.

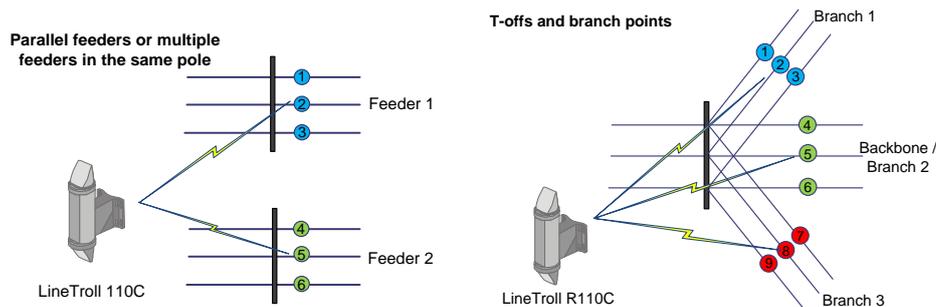


Figure 2,

Configuration and setup

Settings in LineTroll 110Eµr fault indicator

The LineTroll 110Eµr fault indicator has two settings to be made:

- Operational settings with DIP-switch
- Address setting with rotary switch

The operational setting is done with a DIP switch with 8 positions as shown in the below table.



Note:

0=OFF

1=ON

Bit/DIPsw	Value		Function
1	0		Di/dt sensing (6 – 60A)
	1		Threshold sensing (250 – 1000A)
2 and 3	3	2	
	0	0	6A / 250A
	1	0	12A / 500A
	0	1	25A / 750A
	1	1	60A / 1000A
4	0		Start criteria I (current)
	1		Start criteria V (Voltage)
5 and 6	6	5	
	0	0	Timer reset 2h
	1	0	Timer reset 6h
	0	1	Timer reset 12h
	1	1	Timer reset 24h
7	0		Auto reset off
	1		Auto reset on
8	0		Not allow remote programming
	1		Remote programming

DIP setting of the indicator

Setting the addresses of each indicator is done by the rotary switch on the indicator board. In installations with 3 indicators (one for each phase) the addresses must be set to 1, 2 and 3.

In installations with more than 3 indicators (6 or 9) it is important that address 1, 2, 3 are mounted on the same t-off/feeder, address 4, 5, 6 is mounted on each phase on the next feeder and so on. See figure 2.

Inserting the SIM card

To find the type of subscription that is most economic and suitable for your system, please contact your local network service provider.

We do not recommend using prepaid subscriptions. We also recommend disabling voice communication on the SIM cards and only use SMS services.

All PIN codes must be deactivated before installation. Most service providers offer SIM-cards where the PIN codes are deactivated when you receive them.



Insert the SIM-card as shown in the picture to the left. The batteries should be disconnected when inserting the SIM card.

Remove the top-cap of the Collectors housing to access:

- ✓ SIM card socket
- ✓ Programming contact (J3)
- ✓ Activation button (S1)
- ✓ Address settings (SW1)

Operational parameters

Most of the parameters LineTroll R110C uses to operate correctly are set as default values in the firmware. However, some parameters *must* be set such as the telephone numbers the Collector shall send its messages/alarms to, parameters the indicators need to pick up faults correctly and some radio link parameters.

The configuration parameters can be divided into three categories:

- ✓ GSM Parameters
- ✓ Indicator Parameters
- ✓ Radio link Parameters

Some parameters can be sent as SMS to the collector, other parameters require special programming tools. The different programming/configuration options are listed below:

GSM parameters

NetTroll
Cell-phone
NetTroll FDP

Sending SMS through the ComTroll 120 GLR
Sending SMS using a standard cell-phone
Either by serial cable connected to the Collector
or by a standard GSM modem connected to the
computer through a serial port.

FDP-20

Handheld Field Device Programmer. Use a short-range radio to communicate with the Collector.

Indicator parameters

NetTroll
Cell-phone
NetTroll FDP

Sending SMS through the ComTroll 120 GLR
Sending SMS using a standard cell-phone
Either by serial cable connected to the Collector
or by a standard GSM modem connected to the
computer through a serial port.

FDP-20 Handheld Field Device Programmer. Use a short-range radio to communicate with the Collector.

Radio Link parameters

NetTroll FDP Either by serial cable connected to the Collector or by a standard GSM modem connected to the computer through a serial port.

FDP-20 Handheld Field Device Programmer. Use a short-range radio to communicate with the Collector.

All parameters can be sent to the collector and indicators from the control center even when the indicator is installed in the field. Before the FDP-20 handheld programming unit can be used, all parameters must first be uploaded to the FDP-20 either from another indicator or from NetTroll FDP program.

Communication between Collector and Indicators

LineTroll 110EµR fault indicators continuously monitor the status of the line and store the status in a variable. To save battery power, the radio unit in the indicator is switched on and off in intervals.

The Collector sends a status request to each of the indicators every 15 seconds (can be configured). The status request also gives information to the indicators when the next status request will be sent to maximize the performance/power consumption ratio.

When the indicator receives a status request from the Collector, the indicator sends its current status. If this status is changed since the previous status request, the collector will dependent upon several factors send the message in an SMS or wait for further status changes to happen. See the operation chapter for details. When the collector receives an alarm message from the indicator, the status request is sent in shorter intervals to increase response-time.

The messages the indicator can send to the Collector are;

- ✓ Status OK
- ✓ Loss of voltage
- ✓ Transient fault
- ✓ Permanent fault
- ✓ Low battery warning

Status OK

This message is sent when the indicator hasn't detected any fault current and the indicator detects an energized line. This status is also sent when the line is energized after a fault.

Loss of voltage

This message is sent if the indicator detects a de-energized line without any fault current detected. (This feature is default switched OFF but can be switched ON)

Transient fault

When the indicator has detected a transient fault, the indicator will send this message to the Collector.

Permanent fault

Permanent fault is sent when the indicators have defined the fault to be permanent.

Low battery warning

This message will be sent from the indicator when the remaining capacity of the battery is less than a specific level. (Default set to 20%) This message can only be reset by resetting the battery counter in the indicator after changing batteries. See manual for LineTroll 110Eµr for how to reset the battery counter.

Communication between Collector and the central unit

The central unit is normally the NetTroll micro SCADA software or a SCADA Gateway connected to any SCADA system. Regardless of the type of central used, the ComTroll 120 GLR must be connected as the receiver of the messages from the GSM Network. The Collector can also communicate with a standard cell-phone, e.g. for testing and configuration of the GSM parameters.

It is important to notice that the GSM modem in the Collector is normally switched OFF. It will only wake up on the following events:

- ✓ One or more indicators have reported an alarm
- ✓ Polling
- ✓ Heartbeat
- ✓ After power-up (connecting the batteries)
- ✓ Pressing the manual activation button on the Collector
- ✓ Twisting the bottom lens to TEST or RESET

Status message definition

Whenever the indicator sends an alarm, status or a response to a status request, the format of the message is always the same:

Alarm/Status	3	5	Status1	Status2	Analog1	Analog2	X	Tid
--------------	---	---	---------	---------	---------	---------	---	-----

- Analog1: RSSI: Signal strength on the GSM network. The value returned is a value between 0 – 31, were 0 equals -113dBm and 31 equals -51dBm.
- Analog2: Battery voltage. (raw value)
- X: Always '1'
- Tid: A number between 1 and 9 used as a message identifier.

Status1 and Status 2:

These variables give the decimal value representing two 16-bits variables as shown below:

Status1 (16 bit)														Status2 (16 bit)																
X	LB	LB	MH	T	T	T	T	T	T	T	T	T	T	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	
C	I	B		9	8	7	6	5	4	3	2	1	9	9	8	8	7	7	6	6	5	5	4	4	3	3	2	2	1	1
X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

The different bits have the following meaning:

- LBC: '1' = Low battery warning for the Collector
- LBI: '1' = Low battery warning for one or more indicator
- MHB: '1' = Missing heartbeat message. Means one or more indicator have lost communication with the Collector.
- T: Test bit Collector. Set to '1' when the Collector is manually activated by the pushbutton. The pushbutton must be pressed for more than 3 seconds to send the test bit. If it is pressed shorter time no test bit will be sent.
- T1-T9: Test bit Indicators. Set to '1' when the indicators are activated by a TEST command from NetTroll or by twisting the bottom lens into TEST position.
(T1= indicator 1, T2= indicator 2... T9= indicator 9)
- S1-S9: Two-bit status received from the indicators
 '00' Status OK
 '01' Loss of Voltage
 '10' Transient Fault
 '11' Permanent Fault
 (S1=Status from indicator 1 and so on)

The prefix 3 5 will always appear in the front of the alarm/status message.

Setting GSM parameters with SMS

The GSM parameters and the indicator parameters can be set from NetTroll microSCADA or from a cell-phone. It is also possible to set all these parameters with NetTroll FDP or with the handheld Field Device Programmer, FDP-20.

When installing a large number of LineTroll R110C we recommend setting up all devices with NetTroll FDP. All parameters (GSM parameters, Indicator parameters and radio-link parameters) can then be set in one go and makes the configuration as effective as possible.

The configuration in NetTroll FDP can also be transferred to FDP-20. FDP-20 can store up to 8 different configurations which can be transferred to the Collector and indicators by the built-in short-range radio.

The SMS configuration feature is only meant as a supplement when devices are already installed in the field.

Please refer to the *Configuration Manual RIS* for details about setting and configuration.

All configuration properties

The recommended programming method is to use the NetTroll FDP Configuration program. This is a program running on a PC and can communicate directly with the LineTroll R110C using a cable connection.

Using the handheld FDP-20 field programmer is also a good alternative. The FDP-20 can be loaded with a set of different configuration parameters by connecting it to NetTroll FDP. Parameters cannot be manipulated with the FDP-20.

The configuration properties stored on the FDP-20 is uploaded to the LineTroll R110C by a short range radio.

This means the FDP-20 can be used in the field to upload all configuration properties to the Collector, even if the indicators and Collector is mounted on the phases/pole.

See the Configuration manual for details about additional settings and using the NetTroll FDP and FDP-20.

Minimum required settings:

Set primary recipient number

Let the Collector know where to send its alarms and messages. This number is usually the telephone number to the ComTroll 120 GLR, connected to the NetTroll computer.

Set indicator parameters

This can be done by DIP switches on the indicator, but it is recommended to use the remote parameter setting feature. These parameters can be locked with a separate password.

Configure node response

This variable contains information about the addresses of the indicators the collector shall be communicating with. The default setting is Indicator 1, Indicator 2 and Indicator 3. If the configuration for the actual collector is consisting of three indicators (one for each phase) communicating to one collector it is not necessary to change/set this configuration property.

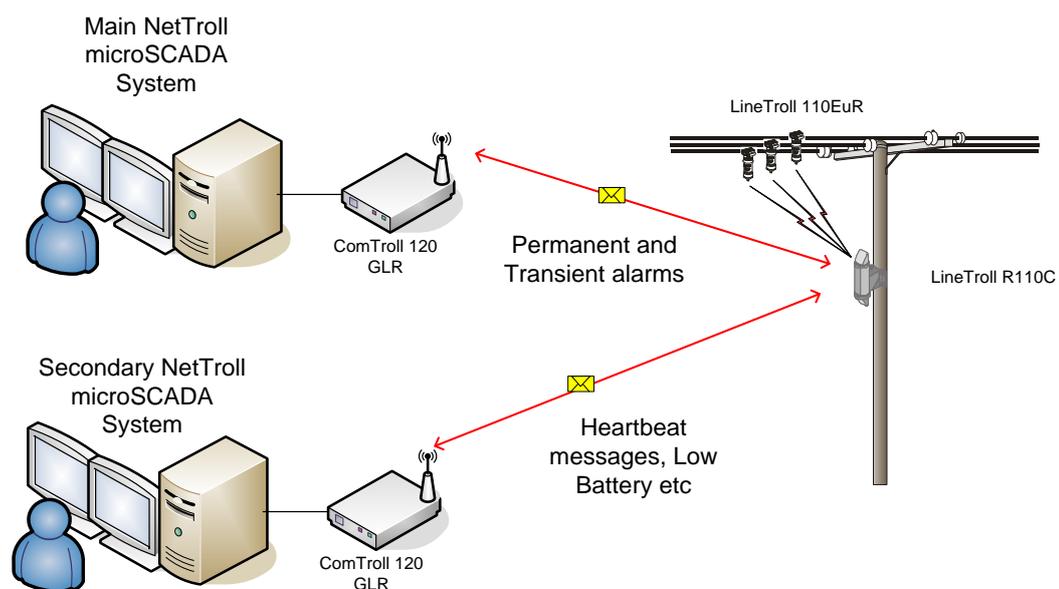
Please note that **#Id9_Config_node_response** can only be set from NetTroll FDP or FDP-20.

Optional settings

The Configuration manual for LineTroll R110C describes all settings in details. This manual describes configuration of the collector using NetTroll FDP and FDP-20 hand-held programming tool.

Sending SMS messages to more telephone-numbers.

The LineTroll R110C can send messages to up to three different receivers. By default, all messages will be sent to all numbers programmed. Alternatively, the unit can be configured to send specific messages to specific numbers.



As the example figure above shows, only the earth faults and short-circuit faults will be reported to the main operational central. Additional messages such as Low

battery warning will be reported to a different receiver which has the responsibility of maintaining the system.

Another example could be to also filter Transient faults from the main central unit and send transient faults to a different team with responsibility for checking what the transient faults are caused by.

Selecting which messages the collector shall forward to the central

In cases where the user only wants to receive specific messages, it is possible to switch ON/OFF three of these messages.

The settings are:

- ✓ Sending Loss of voltage only
- ✓ Sending Transient faults only
- ✓ Sending transient faults and Loss of voltage
- ✓ Sending Permanent faults only
- ✓ Sending Permanent faults and Loss of voltage
- ✓ Sending Permanent and Transient faults **(Default)**
- ✓ Sending Permanent and Transient faults and Loss of voltage

The messages can be set up individually for each of the maximum three recipient numbers.

Limiting the number of SMS messages

If for example a feeder is infested with a lot transient faults within a short period of time, the Collector may end up sending a lot of SMS messages which is really unnecessary. The LineTroll R110C has therefore a limit of the number of messages it can send in a period of 24 hours. The default limit is 100 SMS per 24 hours.

Setting heartbeat- and polling intervals

The heartbeat-interval defines how often the Collector will send a message to the central unit to verify it is working correctly. If NetTroll hasn't received the heartbeat message (it's a complete status message) within two heartbeat-periods, a missing heartbeat message will appear in NetTroll.

It is therefore important that the heartbeat interval set in the Collector is known by NetTroll. If the heartbeat interval is set from a cell-phone, the setting must also be changed in NetTroll database. Default interval is every 6th day (144 hours).

The polling feature will not generate any message. It is just the interval between each time the GSM module connects to the GSM network to check if something is sent to it from the central unit. This is default set to 24 hours. Polling interval must be set shorter than the guaranteed time the SMS will be stored in the GSM network.

The GSM modem will be active for a specified time during a polling sequence. This time can be changed if the time between the Collector connects to the network and when the SMS is delivered from the GSM base-station is very long.

It is also possible to set the active time for heartbeat message and alarms. Please note that these variables will affect the battery lifetime and setting too long active

time will have significant impact to the batteries. The default values are 2 minutes which in most cases are sufficient to send and receive messages.

Sending a command/request from a number not set as receiver.

If a new configuration setting is sent from a cell-phone which is not programmed as any of the recipients, it can be useful to receive a confirmation on the command/request on the senders phone. If this feature is disabled, the sender will not receive any feedback and the confirmation will only be sent to the recipient's numbers programmed in the collector. This is by default set as enabled. If the unit receive advertising messages or any message that do not conform to the correct message format, no reply will be sent.

Sending boot message

The Collector can be setup to send a start-up message to the recipients when the Collector is powered up. This is default switched off.

Switching GSM unit ON/OFF.

The GSM unit in the Collector can be switched OFF by sending a message to the unit from the central or a cell-phone. This means the Collector will not be able to communicate with the GSM network until it is switched on again. Switching the GSM unit on again can only be done by handheld unit FDP-20 or cable connection to the Collector. It is also possible to switch the GSM unit permanently on. This must not be done when the unit is powered by batteries and without any form for charging.

Password protection

When a new configuration setting is sent or a command is executed, a password in the SMS message must match the password set in the Collector. If the password is not matching the message will be rejected.

It is also another password level, where the user can lock the configuration settings. If the locking password is changed or set to another value than the main password it will not be possible to change configuration settings by SMS. The locking password and the main password must be the same if configuration setting can be set.

Setting the Collector address

Normally it will not be necessary to set any collector address. The collector address is only used by the hand-held programming device FDP-20. When there is more than one Collector that can receive configuration settings from FDP-20, the different collectors must have a different address to make sure the right collector is programmed. The maximum is 3 collector addresses. The collector address cannot be set with the rotary-switch on the collector but have to be set by NetTroll FDP.

It is important to notice that using the FDP-20 with radio communication in a workshop to configure devices is not recommended if several collectors are powered up simultaneously. FDP-20 can also be connected to the collector with a cable.

More than one collector within radio coverage

One collector can communicate with up to nine fault indicators within the radio coverage. In situations where e.g. three of the indicators have limited radio contact with the collector, it might be necessary to install one extra Collector for these three indicators. In that case, setting different Collector addresses will not help as the Collector address is not used by the indicator. If there are in total 9 fault indicators in the area where 6 communicates with collector 1, collector 1 must be set up to communicate with indicator 1 -6 and indicators addressed from 1 – 6. Collector 2 must be set up to communicate with indicator 7 – 9 and indicator addressed from 7 – 9. For details about this setting please refer to the *#Id9_Config_node_response* description in the configuration manual.

Resetting configuration parameters back to factory values

All settings can be reset back to its default values. This must be done in the Collector by pressing the manual activation button in the Collector at the same time as the unit is powered up.

Please note that all settings will be set back to default values and the recipient's number will be deleted.

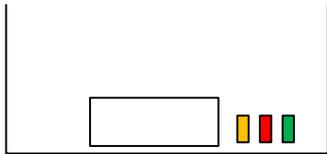
Resetting battery counters in the Collector

When changing batteries in the collector, the battery counter must be reset manually. This is done by setting the rotary switch in position '1' before the new batteries are connected. Then connect the batteries and the three status LEDs will flash as a confirmation that the battery counter is reset. Set the rotary switch back to '0' and the collector starts up again.

Functional description

Status LED on the collector.

The LineTroll R110C has three LEDs which can be seen from the bottom lens. The red and yellow LED's can be switched OFF, setting the debug-bit to '0'.



Green: Flashes slowly during connection to the GSM network. It will start flashing quicker when the GSM module is connected to the GSM network.

Red: Missing heartbeat. Switched ON if communication with one or more indicators is lost.

Yellow: Flash as a confirmation that the radio communication between the collector and all indicators are OK.

Sending alarms upon a network fault.

Transient and permanent faults

The indicators differ between transient faults and permanent faults. If the line is still de-energized 70 seconds after the fault occurs the fault is defined as permanent. If the line is energized within 40sec (30 sec voltage/current reset) the fault will be reported as transient.

Please note that reclosing cycles will not reset the indicator as long as the circuit-breaker stays closed shorter than 30 seconds.

Reporting loss of voltage

If the indicator detects a loss of voltage with duration shorter than approx. 1 minute, these will not be reported.

During a fault where one indicator detects and reports the fault alarm, the other indicators will report loss of voltage in the same SMS message as the fault alarm itself.

Low battery warning

The collector reports low battery warning from the indicators and the collector independently. These messages will appear as separate messages in NetTroll. The

Low Battery Warning message is send when approx. 80% of the battery capacity is used. After changing batteries, battery counters must be reset.

Communication failure between indicator and collector

If the communication with one or more fault indicators is lost, a message will be sent to the recipient numbers.

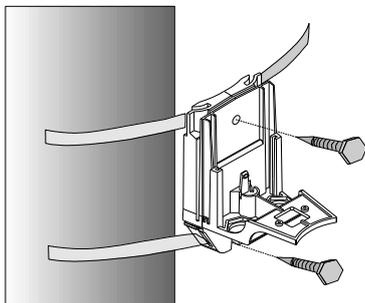
Mounting Instructions

LineTroll 110Eµr fault indicators

Please refer to separate mounting instruction for the fault indicators.

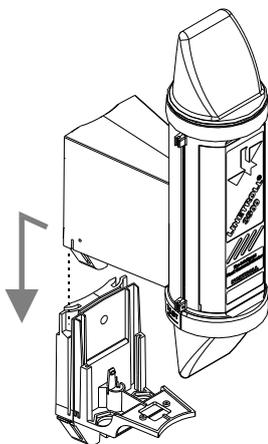
LineTroll R110C

The housing has two main parts: The mounting bracket and the main housing. The Collector should be mounted closer than 40m line-of-sight from the indicator furthest away from the collector.



First mount the bracket in the position most suitable for the installation and communication with the fault indicators.

The bracket is normally installed with strapping-bands made by steel. It is also possible to use screws.



When the bracket is fastened, the main housing can be placed onto the bracket. Slide the housing onto the bracket until the two locks on each side of the housing grips into the bracket.

Please remember to connect the batteries before this operation.

TEST

The communication with the indicators should be tested after installation. By turning the bottom lens counter-clockwise three different sequences can be activated:

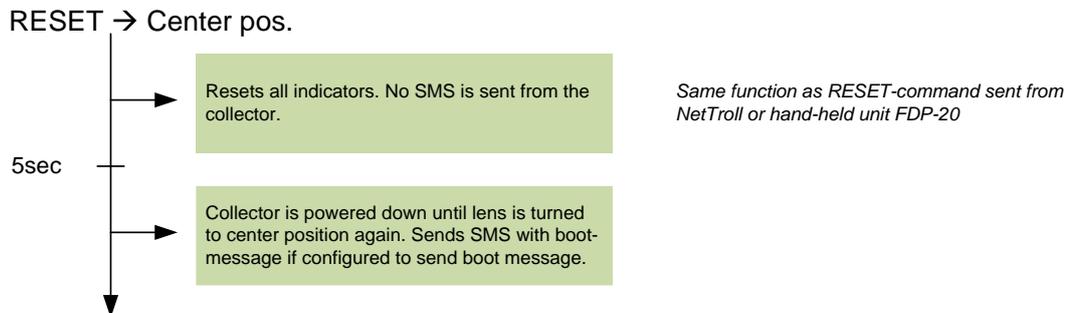
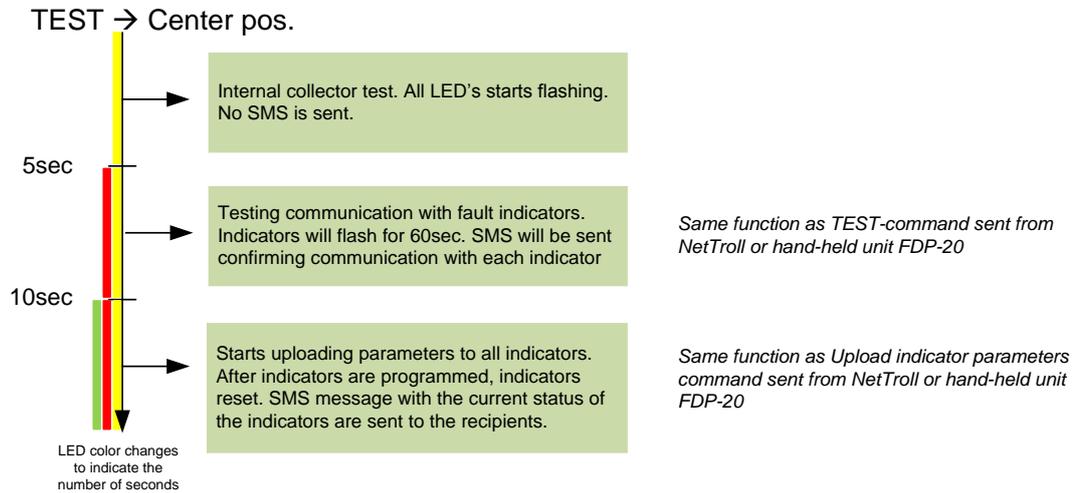
- a) Turn lens into TEST and back to center within 5 sec.
The collector will run an internal test and all status LED in the bottom lens of the collector will flash in a sequence. The indicators will not respond to this test and no SMS will be sent.
- b) Turn lens into TEST for more than 5 seconds, but back to center position within 10 seconds:
The communication with all fault indicators will be tested. The indicators will flash all LEDs for approx. 60 seconds (once every 10 second) to acknowledge that the communication is OK. SMS will be sent to all recipient numbers with the test-bit for each indicator set.
- c) Turn lens into TEST longer than 10 seconds:
The indicator parameters stored in the collector is uploaded to all indicators. Please note that DIP switch 8 in the indicators must be ON to access this function. Also make sure the parameters stored in the Collector are matching the parameters the indicators should have in this installation site.
After successful uploading of the parameters, the indicators will reset and confirm this by flashing the green and yellow LEDs for a few seconds, followed by a yellow or green (Yellow: line de-energized, Green= line energized) flash for approx. 60 seconds. The collector will send SMS to NetTroll with the current status for each indicator.

RESET

The functions provided by turning the lens into RESET position have two different functions:

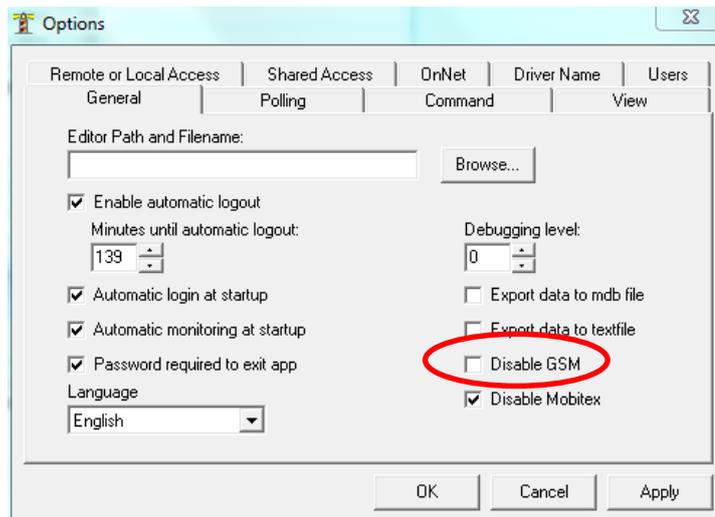
- a) Turn lens into RESET and back to center position within 5 seconds:
The Collector will send a reset-command to all indicators. When the indicators resets, they will acknowledge by flashing the green and yellow LEDs for a few seconds, followed by the yellow LED flashing for approx. 60 seconds. No SMS will be sent.
- b) Turn lens into RESETs and keep it for more than 5 seconds:
The Collector will go into powered-down mode. It will re-power when the lens is turned back to center position. If the collector is set up to send boot message, a SMS is sent to the receivers with the current indicator status. The indicators will not flash for this function.

Summary of TEST and RESET using the bottom lens on the collector unit.



Installation in NetTroll

The LineTroll R110C can be installed in NetTroll version 4.1 or later. By default the GSM feature is disabled. To activate NetTroll for installation of GSM devices, select *View | Options* from the main menu. In the *General* tab, the item 'Disable GSM' must be de-selected.



The GSM LON Router.

The ComTroll 120 GLR must be installed before any GSM Devices can be added into NetTroll Database. This unit is installed in the same way as other devices using the LonWorks technology, e.g. ComTroll 155 RTU with radio communication.

Detailed information about the ComTroll 120 GLR can be found in separate documentation.

All ComTroll GSM devices are installed in the same Subsystem, called "GSM Devices". The procedure for creating new networks and subsystems in NetTroll can be found in the NetTroll User Manual.

Device types

NetTroll have three different device-types for LineTroll R110C:

- a) LineTroll R110C 3 IND
- b) LineTroll R110C 6 IND
- c) LineTroll R110C 9 IND

Select the device type according to the number of indicators the collector shall communicate with.

In the Network View, select GSM Devices and *Add new node*.

In this example we will use the device type for three fault indicators.

Select the name of the ComTroll 120 GLR device you want the LineTroll R110C to be bound to. In large systems it may be better to install several GLR devices to increase response time.

No information is sent to the collector from this window. The device will appear as a new device in the network view the selected name as identifier.



In some GSM networks, the country code are added to the telephone number when a message is sent through the network. If a GLM is programmed whitout using the country code, and the GSM network add the country code, Nettroll will not recognize the message.

Therefore, country code should always be used when programming GSM units in NetTroll.

Setting configuration properties from NetTroll

Not all configuration properties can be sent from NetTroll. It is therefore advisable to configure the device from the NetTroll FDP program.

However, the most common settings can be set from NetTroll. See the list in the following paragraphs.

Set GLR phone number

Set the primary recipient number the collector shall report back to.

Set heartbeat interval

Set the number of hours between each heartbeat message sent from the collector. The interval should not be set shorter than the default 144 hours.

Request heartbeat and polling intervals

This is a request sent to the collector which will report back the stored heartbeat and polling intervals.

Activate sender response

This command will make the collector send back a confirmation on sent messages/commands from a telephone number not stored as one of the three recipient numbers.

Deactivate sender response

This will make the collector not send a respond on sent messages/commands from numbers not stored as one of the three recipient numbers.



The LineTroll R110C will not send back a response on messages which are not following the correct message build-up according to the specification. Advertising messages will therefore not generate any response message even if the sender response is activated.

Set password

Change the default password (ntas) to a user specified password.

Set poll interval

Set the numbers of ours between each time the collector switch the GSM modem ON to respond to messages/commands sent to it.

Get version

Request the firmware version in the collector.

Set uptime

Polling uptime: Number of seconds the GSM modem will be active in a polling sequence.

Alarm uptime: Number of seconds the GSM modem will be active when sending an alarm or heartbeat message.

Check status

Send a status request to the collector. This is the same status request as the *STATUS* button in the command tab.

Set secondary phone number

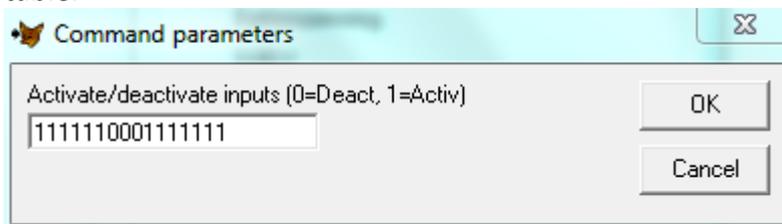
Set the secondary recipient number the collector shall report its alarms to.

Delete secondary phone number

Deletes the secondary recipient number.

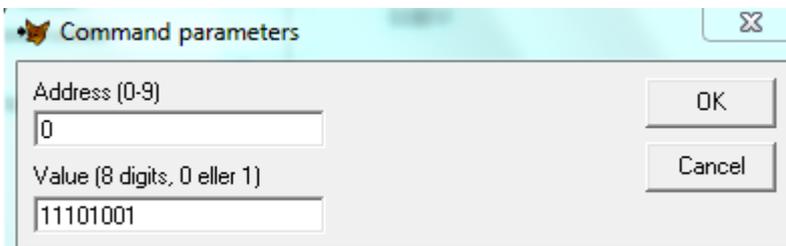
Activate/deactivate inputs

Write the full 16 bit value according to the table shown in the SMS parameter setting table.



In the above example, the LineTroll R110Collector will not send messages from indicators with address 7, 8 and 9 even if the indicators still have radio contact with the collector. Alarms and messages will be rejected by the collector.

Set indicator parameters in collector



Use always address '0'. For details about the value, see the table for setting indicator parameters in the previous paragraph. Please note that this command will not upload the parameters to the indicators. This must be done by a separate command called *Upload indicator parameters from collector*.

Read indicator parameters from collector

The collector will respond with the indicator parameters stored in the collector. Use always address '0'.

Please note that the

Upload parameters to indicators

When the collector receives this command, the collector will start uploading the parameters to all indicators within the communication range.

Setting up analog values in NetTroll

The LineTroll R110C have two analog values which will be sent whenever a status message or alarm are sent from the collector. These values are set up in the default device type definition in NetTroll and should therefore not be changed.

GSM signal level (RSSI)

This value will be read each time the GSM modem wakes up. (Power-up, polling, alarm and heartbeat). The value is sent together with the rest of the status and the value in NetTroll will be updated each time a new status variable is received from the collector.

Battery voltage

The battery voltage is updated when a new message from the collector is received in NetTroll. The collector reads the battery voltage in a configurable interval. The default is every 3600 seconds (every hour). The value presented in NetTroll is maximum one hour old at the time the message is sent from the collector.

Setting up a symbol for LineTroll R110C in a schematics

Setting up symbols for a LineTroll R110C with 3, 6 or 9 connected indicators can be done in many different ways and created in different shapes and colors.

The below description is only an example for how it can be setup in a drawing in NetTroll.

To get the full view of how symbols are created and connected to a physical device, please refer to the Application Note *“Creating symbols and bitmaps in NetTroll”*

Two-bit indications (4-state)

Each indicator has a two-bit status in the SMS variable sent to NetTroll. This means 4 symbols (bitmaps) must be created to show the status of the indicators. In addition, a symbol (bitmap) indicating unknown status is needed.

Fault Indicator Status

value	Status	Symbol	Symbol name
0 0	Status OK/line Energized		R110C000.bmp
0 1	Line de-energized (LoV)		R110C001.bmp
1 0	Transient fault		R110C002.bmp
1 1	Permanent Fault		R110C003.bmp
? ?	Unknown status		R110C255.bmp

The above example symbols are made for drawings using a black background color.

One-bit Indication (2-state)

Low Battery warning.

The collector has two low battery warnings, one for the collector and a separate alarm for one or more of the indicators.

The same symbol/bitmap files can be used for both alarm messages, but needs to be separate symbols in the drawing.

Value	Status	Symbol	Symbol name
0	Battery Level OK		LB110000.bmp
1	Battery Level LOW		LB110001.bmp
?	Unknown status		LB110255.bmp

Indicator communication failure

This is also called Missing heartbeat. It is important to notice that this is not the same *Missing Heartbeat* message that will appear in NetTroll logs when the NetTroll loses the communication with the collector.

This message is also a one-bit indication and can be indicated in a schematic as follows:

Value	Status	Symbol	Symbol name
0	Indicator communication OK		CF110000.bmp
1	Indicator communication failure		CF110001.bmp
?	Unknown status		CF110255.bmp

How will the above example look in NetTroll

To set up a view of the status of one collector with three indicators can look like the below pictures. If the collector will be communication with 6 or 9 indicators, the same bitmaps can be used and placed e.g. in the T-off. The low battery warnings and indicator communication failure will be a common symbol for all indicators.



The status of the three indicators shows an energized line with no faults. The indicator and collector batteries are also OK. Symbol for communication between the indicators and the collector shows OK.



The status of the three indicators shows an energized line with no faults. Low battery from the collector and the communication with one or more indicators are lost are indicated by the two other symbols.



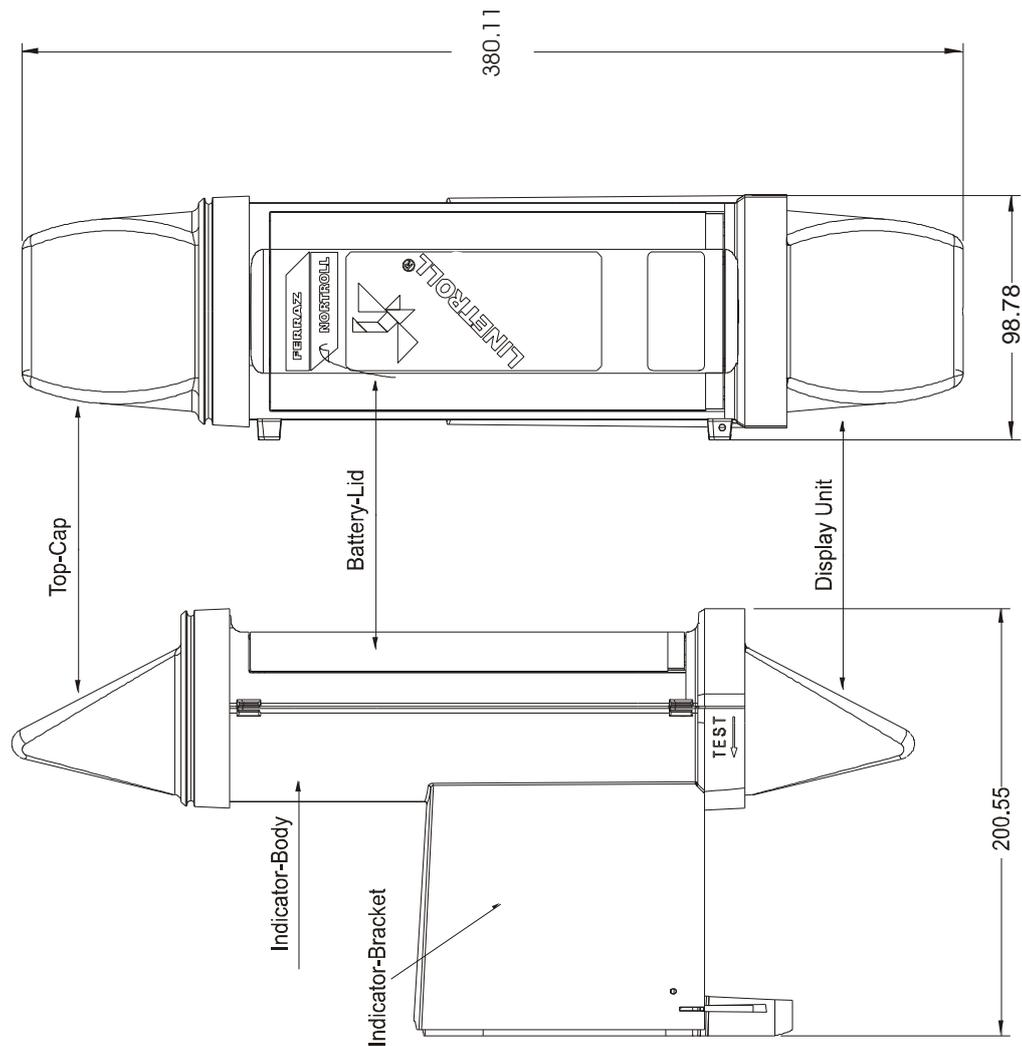
This means there has been a transient fault. The two indicators showing a yellow symbol have most likely clashed into each other, causing the circuit-breaker to trip. The last indicator shows energized line, so the circuit-breaker has restored the feeder upon the reclosing cycle.



This picture shows a permanent fault on one of the phases. The two other indicators have detected a loss of voltage (de-energized line).

The line is dead and the all symbols from this point and up the feeding point will show the same.

Dimensions



Housing dimensions

Technical data

Application:	Indicator Communication Unit with short range radio for monitoring of conductor mounted Fault passage indicators
Short Range Radio Device:	ISM-band. 2,4GHz, 1 mW maximum License Free.
Communication range:	Up to 30m, line-of-sight.
Data rate	250kbps
GSM Module:	AirPrime WISMO228.
Control & Monitoring:	NetTroll MicroSCADA system with ComTroll 120 GSM-LON Router or NetTroll SCADA Gateway
Inputs:	3, 6 or 9 conductor mounted LineTroll 110Eµr indicators.
Power supply:	Two internal long life Lithium batteries (three optional for extended life).
Mounting:	Screws or strap-bands.
Temperature range:	-25 to + 70 deg Centigrade operational.
Dimensions:	380 x 98 x 200 mm
Weight:	1300g