



ComTroll® 115C

QuickLink Collector

User Manual

This document describes the Installation, configuration and use of ComTroll 115C Quick Link Collector

This manual is intended to be read in conjunction with the User Manual for the LineTroll 110E μ r/110T μ r which forms an integral part of an operational QuickLink system

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1. The Quick Link system

1.1 General

The QuickLink communication system uses a license free spread spectrum radio transmitter/receiver (2,4Ghz ISM band) for communication between the *Fault Indicator* and the *Collector*.

The ComTroll 115C *Collector* is designed to work together with LineTroll 110Eur and LineTroll 110Tur. The QuickLink system is intended for short-range communication and the maximum distance between a collector and the fault indicators should not exceed 30m line-of-sight.

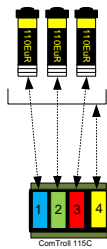
One ComTroll 115C can host up to 9 fault indicators. LineTroll 110Eur/-Tur is a phase mounted fault indicator and one indicator per phase is required to detect all type of faults.

The ComTroll 115C have three relay outputs for indication of a fault on the feeder and one relay output for common alarms from all of the indicators connected to the collector (Low battery and communication failure alarms).

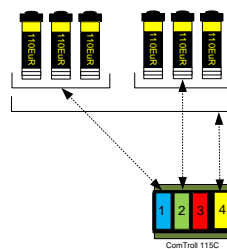
This allows connection to any type of RTU with digital inputs for transmitting the fault alarms to a SCADA system.

1.2 System configurations

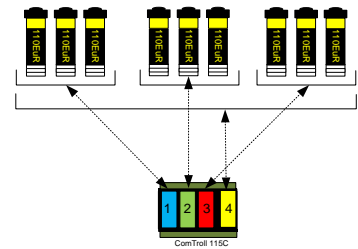
A functional system can be set up in different configurations with various numbers of indicators.



1. Point-to-point (PtP)



2. Point-to-multipoint (PtM) with 6 or 9 indicators used in branch points or in poles with multiple feeders in parallel.



In **Point-to-point (PtP)** mode the system will be able to identify which phase the fault is on and transmit this information to the SCADA as each indicator is addressed to one relay each. In **Point-to-multipoint (PtM)** mode a group of three indicators are addressed to one relay output with a maximum of 9 indicators (three groups). It will in PtM mode not be possible to identify which phase the fault is on. Only the faulty feeder will be identified.

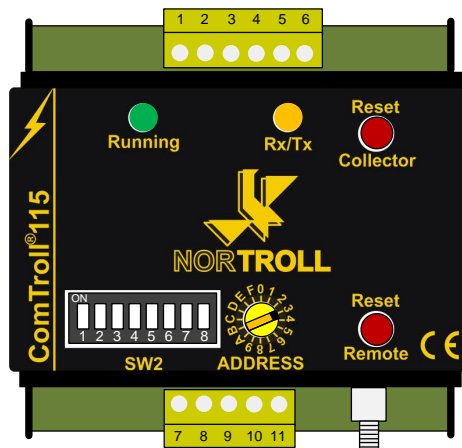
2. Setting up the system

The ComTroll 115C will automatically configure itself for point-to-point (PtP) or point-to-multipoint (PtM) operation based on the address setting.

When using PtP mode it is important to make sure that each individual location does not have radio coverage from a nearby installation of fault indicators using the QuickLink system.

2.1 Point to Point (PtP)

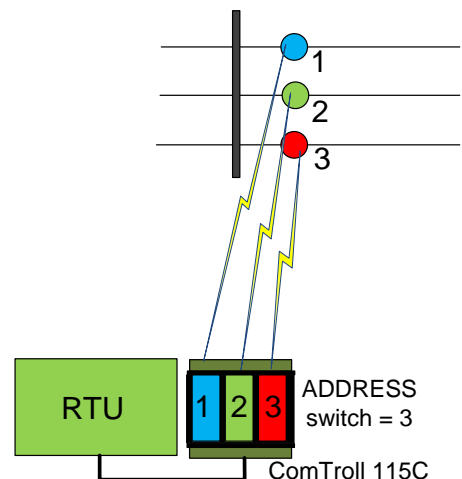
In a PtP system the indicators must be given the address 1, 2 and 3. (See the LineTroll 110Eur/-Tur manuals for address setting of the indicators).



The rotary switch on the ComTroll 115C called "ADDRESS" should be set to the number of indicators used in this location, in this case '3'.

The indicators will in PtP mode operate one individual relay output on the ComTroll 115C each. The Communication failure/Low Battery relay on the ComTroll 115C will be activated if one or more of the three indicators send this message.

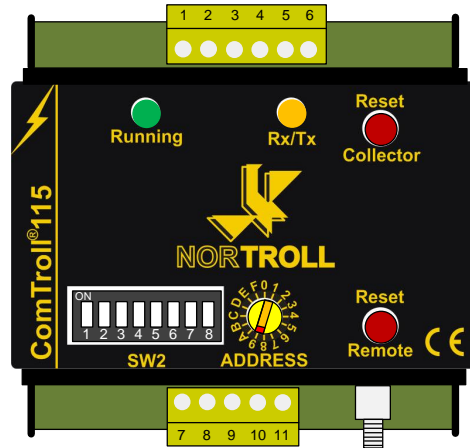
When information about which of the phases the fault is on is required at a branch point, the indicators and the ComTroll 115C must be placed far enough down each feeder such that radio contact cannot be made with indicators on the wrong feeder. The maximum distance of 30 meters should be well exceeded and in case of doubt it should be tested.



2.2 Point to Multipoint (PtM)

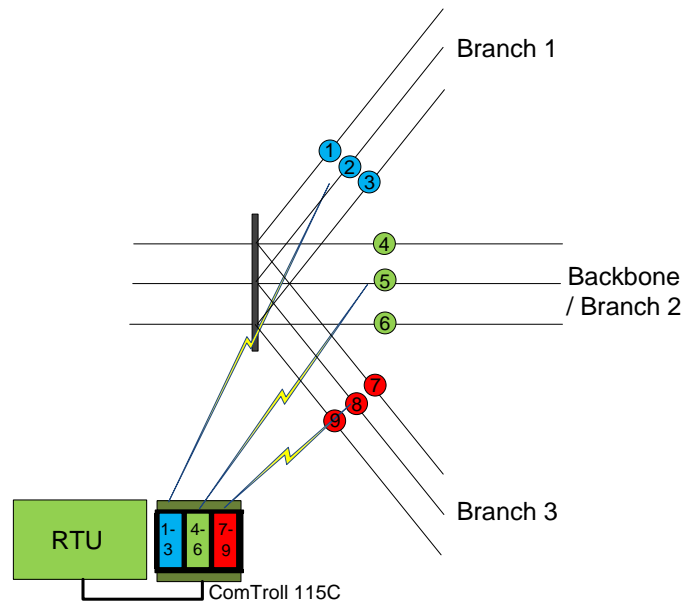
PtP mode is used in branch points where one ComTroll 115C shall monitor more than three LineTroll 110Eur/LineTroll 110Tur indicators.

This mode can also be used where two or three feeders run in the same pole or in parallel.



Each indicator must be given a separate address from 1 up to 9 (or up to the maximum number of indicators used in connection to the Collector).

All 3 indicators on each feeder/branch are configured as a group and each group will use one relay output each on the ComTroll 115C.



Indicators on the same feeder must have consecutive addresses e. g. for branch 1 the addresses must be 1, 2, 3 (blue), then branch 2 must have addresses 4, 5, 6 (green) and finally branch 3 must have the last addresses 7, 8, 9 (red). See illustration above.

The indicators on each branch/feeder will operate the following relays on the ComTroll 115C:

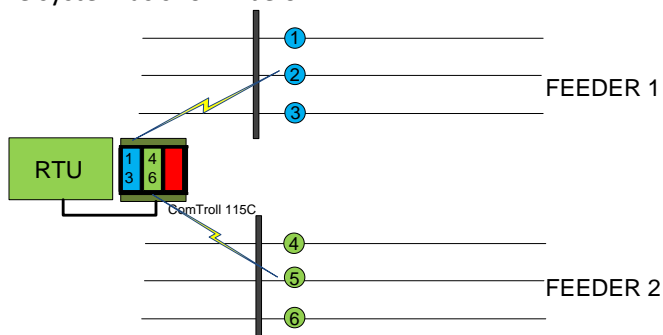
Indicator addresses 1, 2 and 3 (blue feeder); operates relay 1.

Indicator addresses 4, 5 and 6 (green feeder) operates relay 2.

Indicator addresses 7, 8 and 9 (red feeder); operates relay 3.

The Communication failure/Low Battery relay on the ComTroll 115C will be activated if one or more of the indicators are sending this message.

The PtM mode is also useful in networks where two feeders run in parallel in an OHL networks gate. In such cases, it is not possible to use pole-mounted indicators. Instead of having separate ComTroll 115C and RTU for each feeder, the PtM mode can be used to make a more cost effective system as shown below.

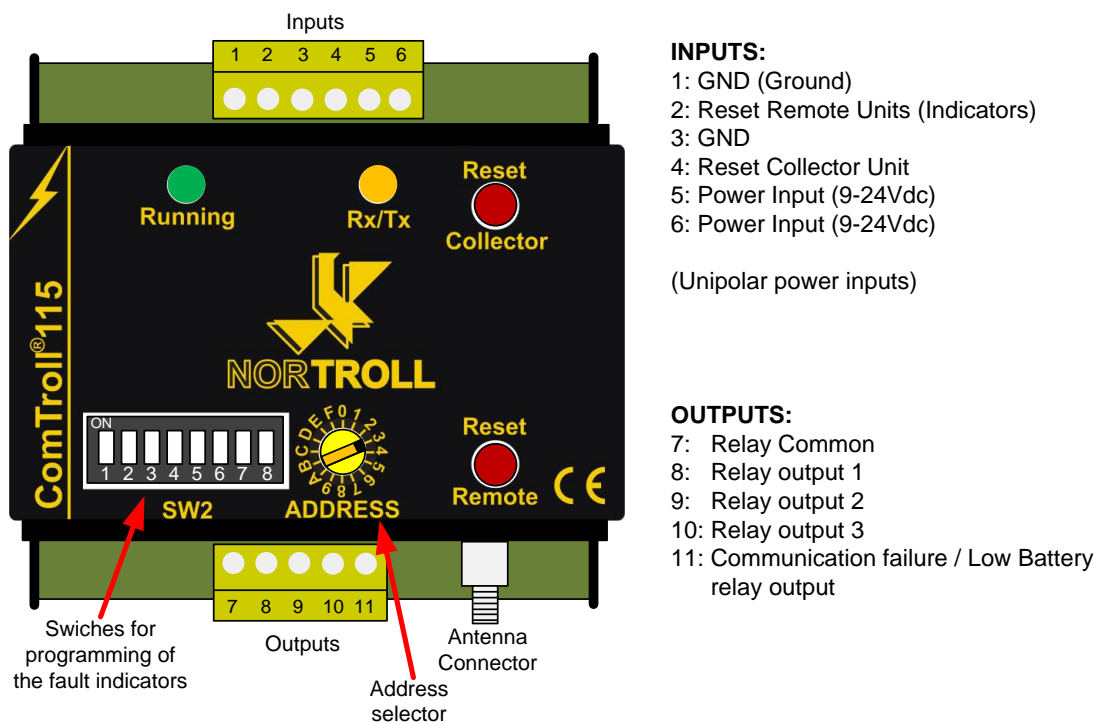


The ADDRESS switch on the ComTroll 115C must be set to 6 as 6 separate indicators are using the same collector. See also section 2.3 about address setting.

2.3 Sw2 on ComTroll 115C

The DIP-switch 2 is only used for setting up parameters in the LineTroll 110Eur/-Tur. See separate section for remote programming of the indicators.

2.4 Hardware overview



LED Indications:

Rx/Tx: Flashing when the unit is sending or receiving.

Running: Flashing when the unit is powered and running OK.

Please note that both LED's are used for other indications during special operations. See the specific sections for explanations.

Switches and buttons

Reset Remote: Used for test, reset, status check and programming of the Fault indicators. This button is connected in parallel with Terminal 2 in the input connector.

Reset Collector: Resets the ComTroll 115C collector unit. Active relay outputs will also be reset. Reset Collector must take place after changing/setting the Address Selector. Button is connected in parallel with terminal 4 on the input connector.

2.5 Table for address setting

ADDRESS Switch on CmT115C	Grouping	LineTroll 110Eur/Tur addresses									
		No of indicators	1	2	3	4	5	6	7	8	9
0	NOT VALID										
1	Point-to-point mode	1	R1								
2		2	R1	R2							
3		3	R1	R2	R3						
4	Group á 3 indicators Point-to-Multipoint	4	R1	R1	R1	R2					
5		5	R1	R1	R1	R2	R2				
6		6	R1	R1	R1	R2	R2	R2			
7		7	R1	R1	R1	R2	R2	R2	R3		
8		8	R1	R1	R1	R2	R2	R2	R3	R3	
9		9	R1	R1	R1	R2	R2	R2	R3	R3	R3
A	NOT VALID										
B	Group á 2 indicators Point-to-Multipoint	2	R1	R1							
C		4	R1	R1	R2	R2					
D		6	R1	R1	R2	R2	R3	R3			
E	NOT VALID										
F	NOT VALID										

R1, R2 and R3 mean: Relay 1, Relay 2 and Relay 3 on the ComTroll 115C.
 The rotary switch called 'ADDRESS' is used to configure the Collector with the number of indicators connected. Based on the Address switch setting, the ComTroll 115 C will automatically select PtP mode or PtM mode.

An exception from this rule is when groups of 2 indicators pr. feeder are used. (For short circuit (Phase-to-phase faults) indication only)

Note the track/slot in the rotary switch for address setting to avoid incorrect setting; 180deg. The track/slot may have a red spot to make the orientation more clear. See below.



Checking the address setting

If the address switch is set to a higher number than the number of connected indicators, it will operate the common relay output (Communication failure or Low Battery) as it expects to receive information from an indicator which is not connected to the system.

If the address switch is set to a lower number than the number of indicators connected no alarms will be provided. But it will mean that the one or more indicators will not be polled when executing a Test/Reset. If one or more indicator does not flash after a Test/Reset, the address switch is most likely set incorrectly.

3. Functional description

3.1 Local operation from the Collector

The button **Reset Remote** has three different functions:

	Time pressed	Function
1	0,5sec - 2sec	Status check of the indicators and resetting of indication
2	2sec - 4 sec	Test communication and relay operation
3	more than 4 sec	Upload new settings in the fault indicators

1. STATUS CHECK and RESET OF INDICATION:

Press **RESET REMOTE** for maximum 2 sec. Both the yellow and green LED on the ComTroll 115C collector will be switched ON:

The fault indicators will respond with information about whether they are ready for being remotely programmed or not (DIP-switch 8 on the indicators are ON or OFF). The fault

indicators will also respond with information about whether the line voltage (or load current) is above or below the set-point used by the indicator for trip and reset of the indicator.

The indicators will respond as follows:

- a) If the fault indicator DIP8 is OFF, the indicator cannot be remotely programmed. The yellow and green LED (on the indicators) will flash simultaneously.
- b) If the fault indicator DIP8 is ON, the indicator is ready for remote programming. The yellow and green LED (on the indicators) will flash alternating.

Point a) and b) will be indicated for 9 seconds.

- c) If the line voltage (or load current) is above the threshold for the indicator the green LED on the indicator will flash.
- d) If the line voltage (or load current) is below the threshold for the indicator the yellow LED on the indicator will flash.

Point c) and d) will be indicated for 3 minutes.

If the Collector does not get any feedback from one or more of the fault indicators, it will close the communication failure relay output to indicate a problem with the communication.

2. Communication check and test of relay operation

Press **RESET REMOTE** for more than 2seconds but not longer than 4seconds until the Rx/Tx-LED (yellow LED on the collector) is switched off.

Within maximum 12 seconds, all fault indicators should switch on both the yellow and green LED (in the indicator). When the broadcast period is finished (12 seconds) the green LED will be switched off.

The yellow LED in the indicator remains on for period of 10s + address-ID. (e.g in indicator with address '7' the yellow LED will be on for 17 seconds).

After this period the main indication LED (for permanent faults) will flash once and transmit a fault message to the collector which will set a pulse on the corresponding relay output.

3. Uploading new settings in the fault indicators (remote programming)

To upload new settings for the fault indicators, SW2 DIP 1 -7 is used. These switches "mirror" the setting in the LineTroll 110Eur and LineTroll 110Tur. See tables in section 3.3 for programming details. Please note that DIP8 on the fault indicator must be ON to accept remote uploading from the collector.

Press **RESET REMOTE** for more than 4sec until the Rx/Tx-LED (yellow) and the Running led (green) starts flashing on the Collector.

When the fault indicators have uploaded and stored the new settings, the yellow and green LED in the indicator will flash alternating

If DIP8 on the fault indicators is off, the yellow and green LED in the indicator will flash simultaneously to indicate that the indicator cannot be remotely programmed.

3.2 Remote operation from SCADA.

Remote test and reset can be executed from SCADA through a RTU that can provide a closing relay contacts (pulse) with the same duration as the corresponding operation by using the pushbuttons. Inputs are connected in parallel with the pushbuttons. See chapter 3.1 for details.

3.3 Setting up the fault indicators.

The user manual for the fault indicator describes in detail the necessary setup of the fault indicator. When doing this setting from the ComTroll 115C the meaning of SW2 on the collector will be the same as for the DIP switch on the indicator except for DIP8. This is not used in the ComTroll 115C.

To set up the indicator parameters, set the switches according to the table below and upload the settings by following the procedure in chapter 3.1.3

For LineTroll 110Eur:

Function	Setting	DIP switch number							
		1	2	3	4	5	6	7	8
Di/dt Current trip level	6A	0	0	0					
	12A	0	0	1					
	25A	0	1	0					
	60A	0	1	1					
Threshold trip level	250A	1	0	0					
	500A	1	0	1					
	750A	1	1	0					
	1000A	1	1	1					
Start/Stop criteria	Current				0				
	Voltage				1				
Timer reset	2h					0	0		
	6h					0	1		
	12h					1	0		
	24h					1	1		
Auto Reset Voltage or current	Off							0	
	On							1	
Enable remote programming	NO								0
	YES								1

For LineTroll 110Tur:

		DIP switch number							
Function	Setting	1	2	3	4	5	6	7	8
Status Indication Duration	2 min	0							
	5 min	1							
Di/dt and Threshold trip level	Di/dt = + 500A		0	0					
	Di/dt = + 1000A		0	1					
	Threshold = 500A		1	0					
	Threshold = 1000A		1	1					
Start/Stop level	Current > 50A				0				
	Voltage > 50kV				1				
Timer reset	2h					0	0		
	6h					0	1		
	12h					1	0		
	24h					1	1		
Auto Reset and 24h indication of transient faults	Off							0	
	On							1	
Enable remote programming	NO								0
	YES								1

3.4 Indication of permanent or transient faults

The ComTroll 115C collector can be set to indicate permanent- or transient faults. The setting is done by SW2, DIP8.

When the switch is OFF, the relay output will be set as soon as the indicator detects a fault, regardless whether the fault is transient or permanent. The relay will be deactivated 30 seconds after the indicator has detected an energized line.

If the switch is ON, the relay output will be activated only if the indicator defines the fault as a permanent fault. The indicator will send permanent fault status to the collector if the reclosing cycles fail and the line is still de-energized 70 seconds after the fault occurs.



The relay output on the collector will be active until the timer reset in the indicator expires or the line is energized after a fault.

4. Installation

4.1 LineTroll 110Eur/Tur

The LineTroll 110Eur /Tur must be set up with operational parameters before installing it in the field. It can also be done remotely from the ComTroll 115C collector after installation on the line, providing DIP8 on the indicator is set to ON.

When the DIP switches on the fault indicator are used as programming method, it is important that the indicator is reset after the setting is made. This can be done by holding a magnet at the RESET spot on the indicator or by disconnecting the batteries and connect the batteries again.

Please make sure the red LED on the indicator flash 5 times to confirm a reset.

4.2 Antenna

The antenna for the ComTroll 115C is provided as three separate items.

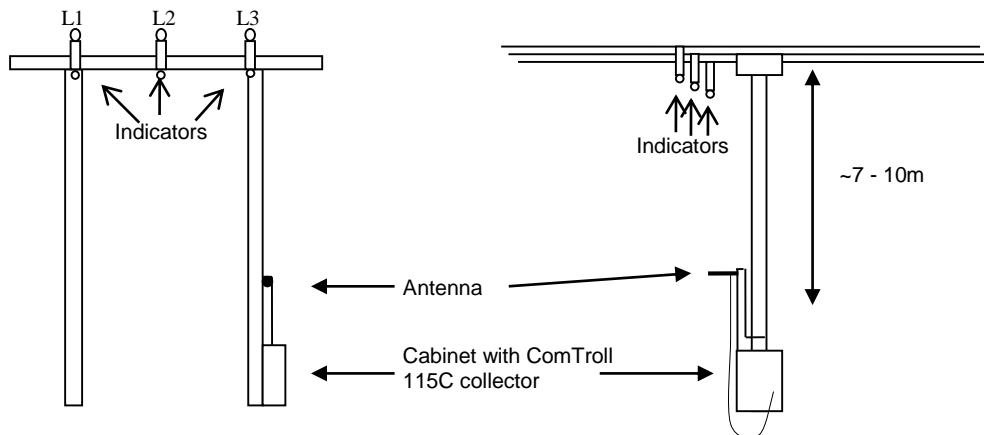
- A bracket
- An Antenna element
- A coaxial cable

Place the male end of the cable through the hole in the end of the bracket and screw the antenna element to the cable.

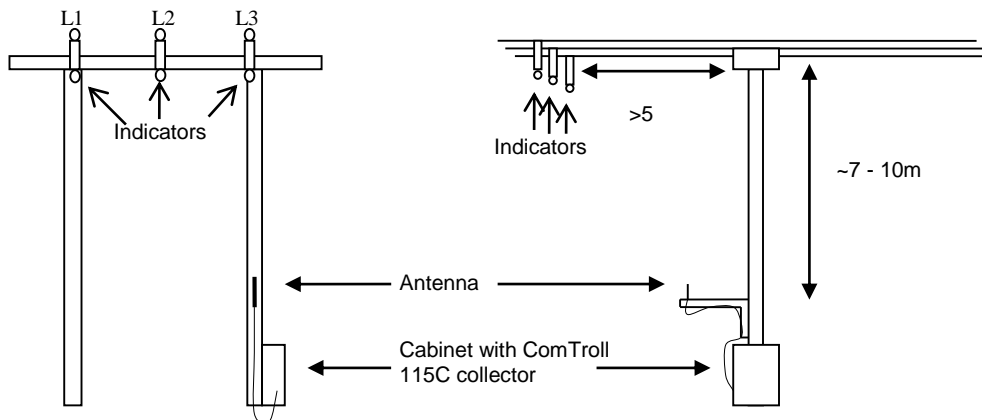
Tighten antenna until it is finger tight, do not use pliers or excessive force. The antenna should look like the picture after assembly. The antenna bracket can be mounted on the pole by use of strap bands or screws. (Not included).



If the indicators are mounted straight above the cabinet with the ComTroll 115C, the antenna should be mounted horizontally as the figure below illustrates.



In case of longer horizontal distance between antenna and Indicators, the best performance is obtained if the antenna is mounted in vertical position, see illustration below.



NOTE

The maximum distance between the antenna position and any of the fault indicators should not exceed 30 meters.

The communication between the ComTroll 115C and all of the indicators should always be checked after the installation.

4. Technical data

Short Range Radio Device: Preferentially ISM-band. 2,4GHz, 1 mW maximum License Free.

Communication range: Up to 30m, line-of-sight.

Data rate 250kbps

Field upgradeable microcontroller

Relay Outputs 4 normally open relay outputs:
1. Indicator 1 /group 1
2. Indicator 2 /group 2
3. Indicator 3 /group 3
4. Communication failure (missing heartbeat) or low battery warning.
Potential free NO, Max 30W (non-inductive load)

Inputs: The two digital inputs are internally connected to the push-buttons in the front and provide following functions:

	Time pressed	Function
1	0,5sec - 2sec	Status check of the indicators and resetting of indication
2	2sec - 4 sec	Test communication and relay operation
3	more than 4 sec	Upload new settings in the fault indicators

Note! Activation of the input is done by shorting the input to GND.

Supply Voltage 12-24VDC +/- 10%

Power consumption: 5mA @ 12VDC

Materials
Bracket: Aluminium
Antenna: Moulded rubber
Collector: Nylon

Operational Temp Range: -40°C to +70°C (-40°F to 158°F) 90% humidity, non-condensing.

Test standards
EN 61000-6-3 (2007)
EN 61000-6-2 (2005)
EN 60255-21-1 (1995)
EN 60255-21-2 (1995)