



Design Guidelines for

LANmark-6 A Cabling System

Technical Paper
Nexans Cabling Solutions
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1 Introduction

The following installation requirements cover the minimum length configurations for installing a Nexans LANmark-6A structured cabling system.

The LANmark-6A cabling system has been designed not only to meet but exceed the demanding requirements of Augmented Cat 6 and Class EA Standards. The headroom of LANmark-6A above the minimum requirements from the international standards can be used to build shorter links and channels than the one recommended by standards.

Both, the standard recommendations and the Nexans specific length restrictions are described below.

2 Standards Compliance

All installations must follow industry best practice and demonstrate compliance to the relevant sections of ISO/IEC 11801, EN50174, TIA/EIA 568 B series of documents and shall be tested to ANSI/TIA/EIA568B.2-10 or ISO/IEC 11801:2002/A1:2008. For more details refer to the 'Field Test Procedure of LANmark-6A Cabling System'.

3 Length Considerations for installation according to cabling standards

3.1 Length specifications

The following minimum and maximum length specifications apply according to international standards:

Table 1 - Minimum and Maximum length (*)

Segment	Minimum m	Maximum m
FD-CP	15	85
CP-TO	5	-
FD-TO (no CP)	15	90
Work area cord ¹	2	5
Patch cord	2	-
Equip cord ²	2	5
All cords	-	10

Note 1 If there is no CP, the minimum length of the work area cord is 1m.
Note 2 If there is no cross-connect, the minimum length of the equipment cord is 1m.

(*) Source: Table 31 of ISO/IEC 11801:2002/A1:2008-04

Whereas the maximum length is given as a normative requirement, minimum length is an informative requirement and is given to indicate which length limitations were assumed when the component and link limits for electrical performance have been selected. It is recognized that short links with a high number of connection points at close proximity do generate more internal crosstalk and reflections. Therefore it is likely, that below these minimum configurations headroom can not be given anymore and link testing might even fail. Star pass results at the short length are very likely, if not normal, according to the standards.

3.2 Stranded Cable Length Compensation

The attenuation of the flexible stranded cable is higher than the solid horizontal cable, therefore the maximum length of the permanent link must be reduced accordingly. The maximum link length = 90 m of solid horizontal cable. For every 1 m of additional flexible cable (above the 10m calculated for patchcords already) used between the Consolidation Point and the Telecommunications Outlets, the horizontal cable must be reduced by 1,5 m (see table).

Following table shows the length calculation taking in consideration the length of each portion of the channel:

Table 2 - Horizontal link length equations

Model	Figure	Implementation Equations		
		Class D channels	Class E and E _A channels	Class F and F _A channels
Interconnect - TO	12a	$H=109 - FX$	$H = 107 \cdot 3^{\alpha} - FX$	$H = 107 \cdot 2^{\alpha} - FX$
Cross-connect - TO	12b	$H=107 - FX$	$H = 106 \cdot 3^{\alpha} - FX$	$H = 106 \cdot 3^{\alpha} - FX$
Interconnect - CP - TO	12c	$H=107 - FX - CY$	$H = 106 \cdot 3^{\alpha} - FX - CY$	$H = 106 \cdot 3^{\alpha} - FX - CY$
Cross-connect - CP - TO	12d	$H=105 - FX - CY$	$H = 105 \cdot 3^{\alpha} - FX - CY$	$H = 105 \cdot 3^{\alpha} - FX - CY$

- H the maximum length of the fixed horizontal cable (m)
- F combined length of patch cords/jumpers, equipment and work area cords (m)
- C the length of the CP cable (m)
- X the ration of cord cable insertion loss (dB/m) to fixed horizontal cable insertion loss (dB/m) - see Clause 9
- Y the ration of CP cable insertion loss (dB/m) to fixed horizontal cable insertion loss (dB/m) - see Clause 9

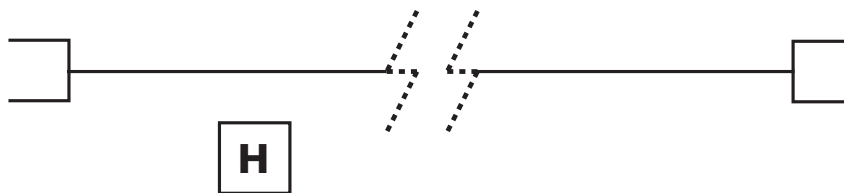
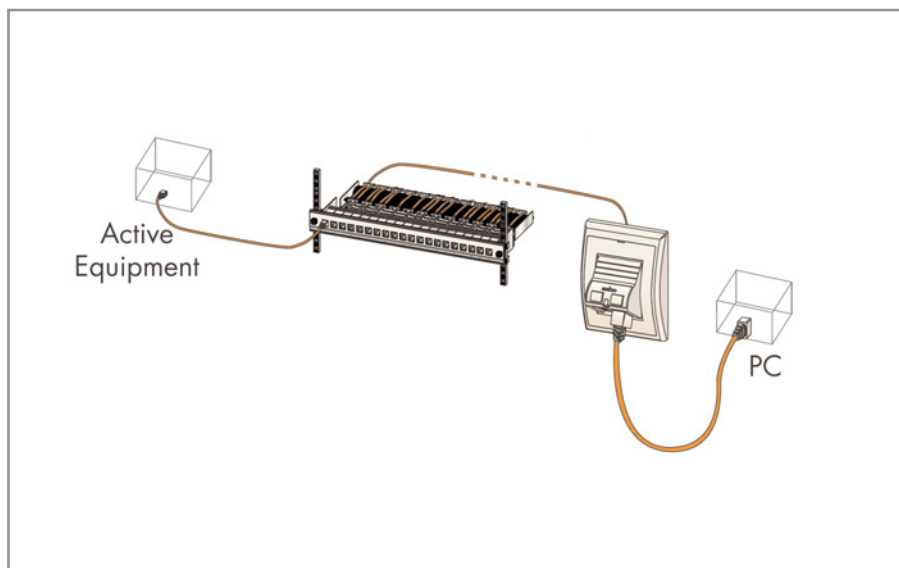
NOTE For operating temperatures above 20°C, H should be reduced by 0.2% per °C for screened cables; 0.4% per °C (20°C to 40°C) and 0.6% per °C (>40°C to 60°C) for unscreened cables.

^α This length reduction is to provide an allocated margin to accomodate insertion loss deviation.

3.3 Permanent Link Length Installation Guidelines for LANmark-6A

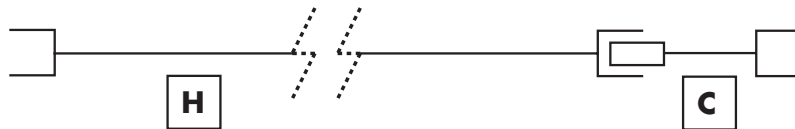
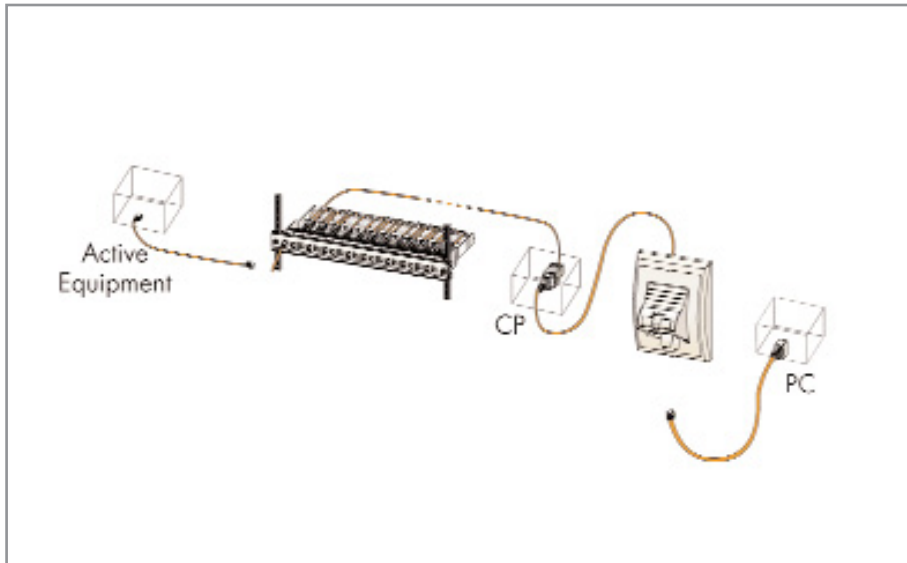
The following length restrictions apply to LANmark-6A products only. In case Cross Connects and Consolidation Points are used, LANmark-6A Ultim patchcords series have to be used to build the CC or CP links.

3.3.1 2 Connector Link Installation Guidelines



Description	Minimum	Maximum
H Horizontal Permanent Link	5m	90m

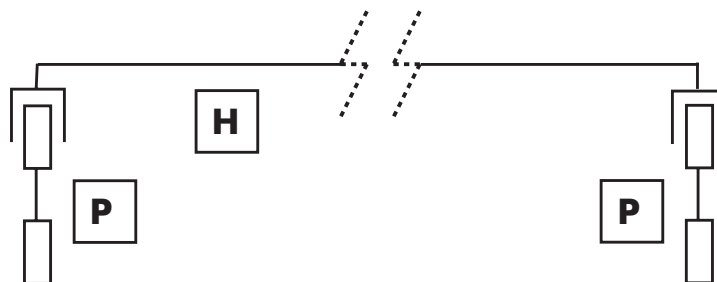
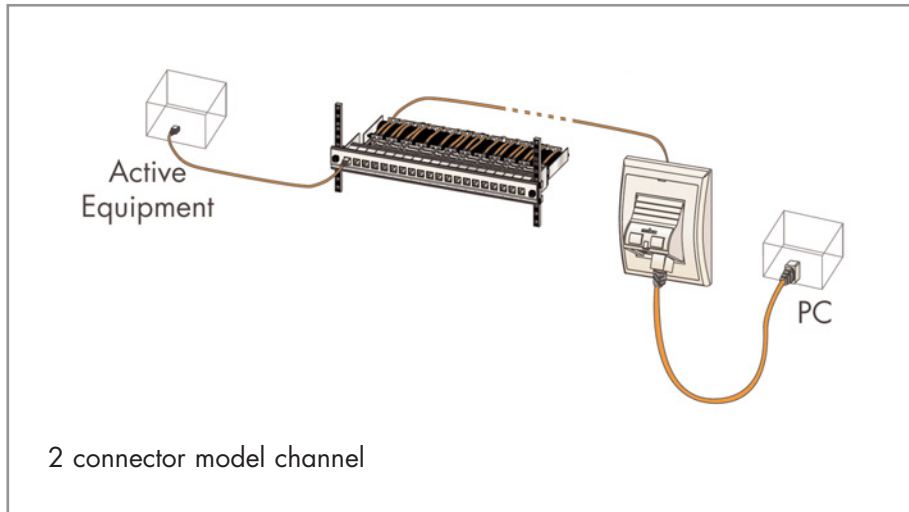
3.3.2 3 Connector Link Installation Guidelines



	Description	Minimum	Maximum
H	Horizontal Permanent Link	5m	90m - (C*1.5)
C	Consolidation Point	5m	20m
H + C	Total Link Length	5 + 5 = 10m	90 - (5*1.5) + 5 = 87.5m

3.4 Channel Installation Guidelines for LANmark-6A

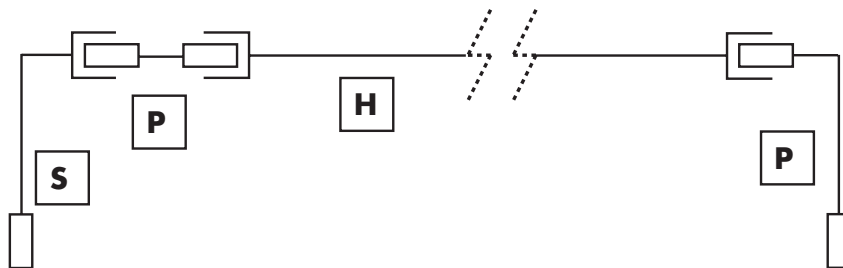
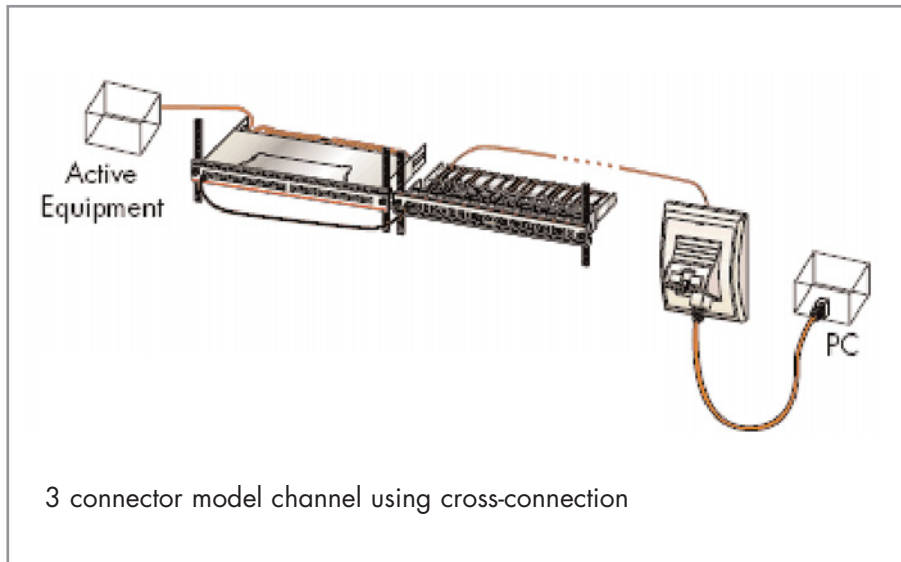
3.4.1 2 Connector Channel Installation Guidelines



Description		Minimum	Maximum
H	Horizontal Permanent Link	5m	90m
P	Patch cord	1m	5m
H + 2P	Total Channel Length	$5 + 1 * 2 = 7m$	$90 + 5 * 2 = 100m$

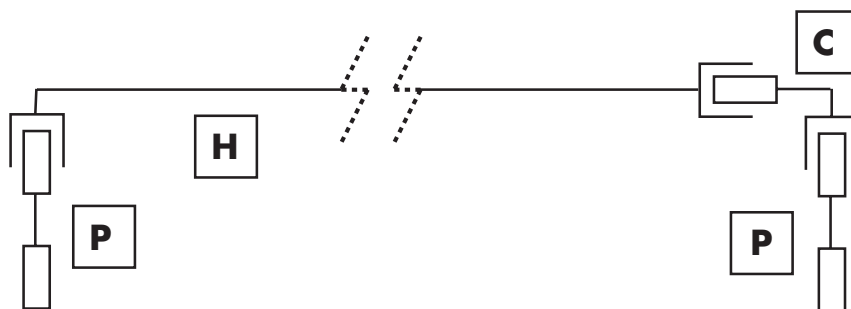
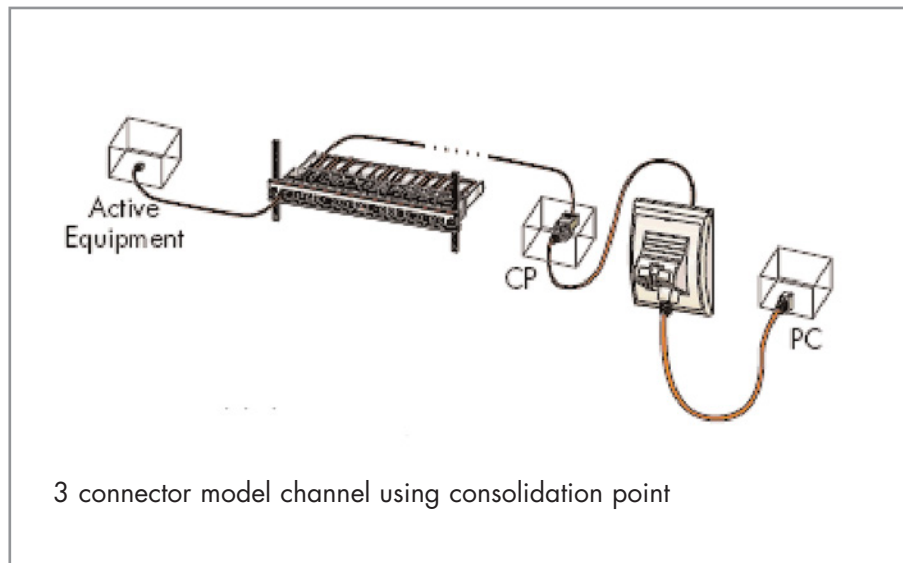
3.4.2 3 Connector Channel Installation Guidelines

3.4.2.1 3 Connector Model Using Cross-Connection



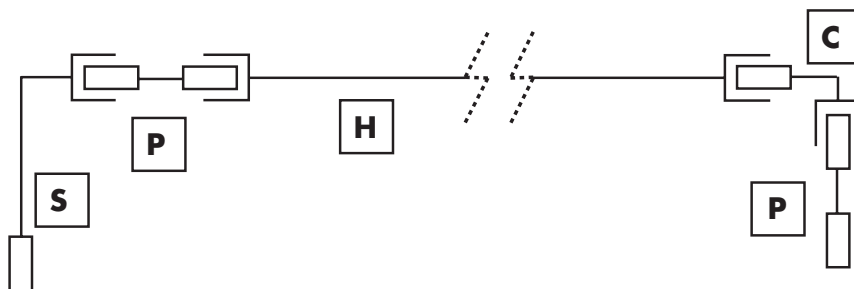
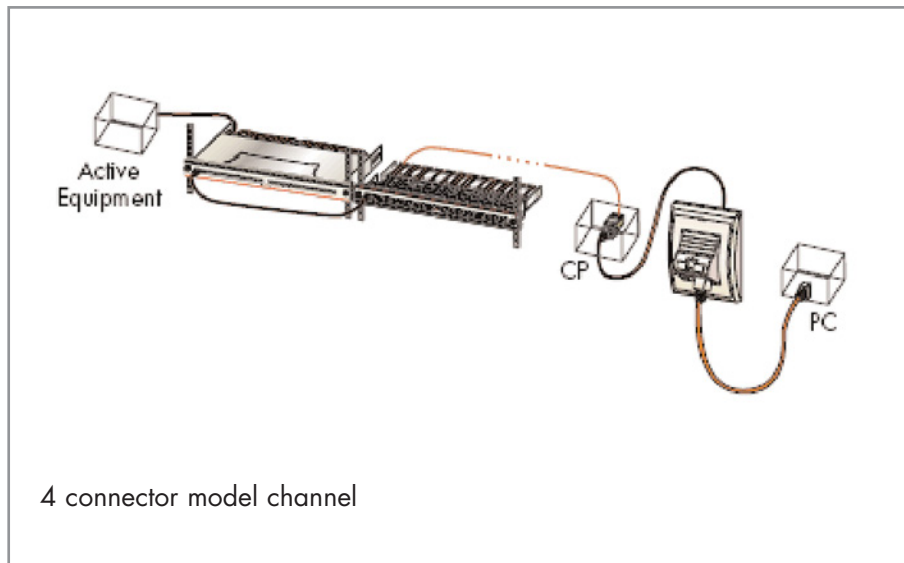
	Description	Minimum	Maximum
H	Horizontal Permanent Link	5m	90m - (S*1.5)
S	Service Presentation / Cross Connect	5m	20m
P	Patch Cord	1m	5m
H+S+2P	Total Channel Length	5 + 5 + 1*2 = 12m	90 - (5*1.5) + 5 + 5*2 = 97.5m

3.4.2.2 3 Connector Model Using Consolidation Point



	Description	Minimum	Maximum
H	Horizontal Permanent Link	5m	90m - (C*1.5)
C	Consolidation Point	5m	20m
H + C	Total Link Length	5 + 5 = 10m	90 - (5*1.5) + 5 = 87.5m
P	Patch Cord	1m	5m
H+C+2P	Total Channel Length	5 + 5 + 1*2 = 12m	87.5 + 5*2 = 97.5m

3.4.3 4 Connector Channel Installation Guidelines



Description		Minimum	Maximum
H	Horizontal Permanent Link	5m	$90m - ((C+S) * 1.5)$
C	Consolidation Point	5m	20m
H + C	Total Link Length	$5 + 5 = 10m$	$90 - ((5+5) * 1.5) + 5 = 80m$
S	Service Presentation / Cross Connect	5m	20m
P	Patch Cord	1m	5m
H+C+S+2P	Total Channel Length	$5 + 5 + 5 + 1 * 2 = 17m$	$80 + 5 + 5 * 2 = 95m$



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