

CLV69x Bar Code Scanner

Mounting, electrical installation and
reading field diagrams



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1 About this document

Additional information on the **mounting** and **electrical installation** of **CLV69x without heater**, as well as **reading field diagrams of all device variants** is summarized in this document. It is intended for suitably qualified installation and commissioning personnel.

Notes on commissioning, configuration with SOPAS ET and maintenance is included in the operating instructions for CLV69x.

Information on the CLV69x can also be referred to in the Internet on the product page for the CLV69x under **www.mysick.com/en/clv69x**:

- Technical data in the online data sheet (PDF)
- Dimensional drawing and 3D CAD dimension models in various electronic formats
- EC Declaration of Conformity (PDF)
- SOPAS ET configuration software with online help
- Product information with an overview of the accessories (PDF)
- CLV69x operating instructions
- This technical information

Support is also available from your sales partner to be found under **www.sick.com/worldwide**.

Symbols used

Some information in this document is highlighted as follows to facilitate quick access to this information.

NOTICE

Note!

A notice refers to a potential risk of damage or loss of function of the CLV69x or the devices connected up to it.



WARNING

Warning!

A warning refers to specific or potential dangers to the physical safety of the user. It is there to protect the user against accidents.

The safety mark next to the warning, on the left, refers to the type of accident risk, e.g. electricity-related. The ascending warning levels (CAUTION, WARNING, DANGER) refer to the severity of the possible danger.

- Always read the warnings carefully and make sure you comply with them.

Important This important note is there to advise you on special aspects.



This symbol refers to supplementary technical documentation.

Safety information

- Read the notes on mounting and electrical installation prior to carrying out the work.
- Read additionally the operating instructions of the CLV69x to familiarize yourself with the device and its functions.
- Only use the device under permitted ambient conditions (e.g. temperature, ground potential).
- Opening the screws of the CLV69x housing will invalidate any warranty claims against SICK AG.
- Repair work on the CLV69x may only be performed by qualified and authorized service personnel from SICK AG.

Warnings

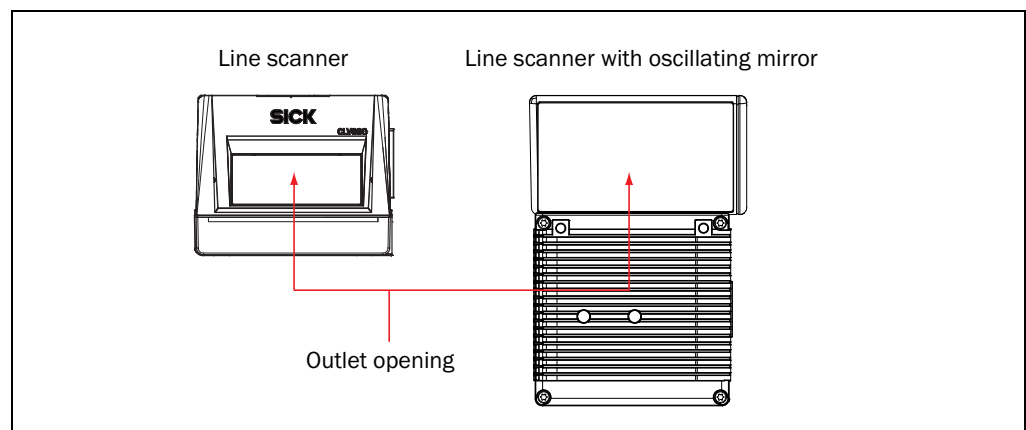


CAUTION

Laser radiation!

The CLV69x works with a red light laser diode and corresponds to laser class 2.

The entire reading window is a laser exit opening of the visible laser radiation.

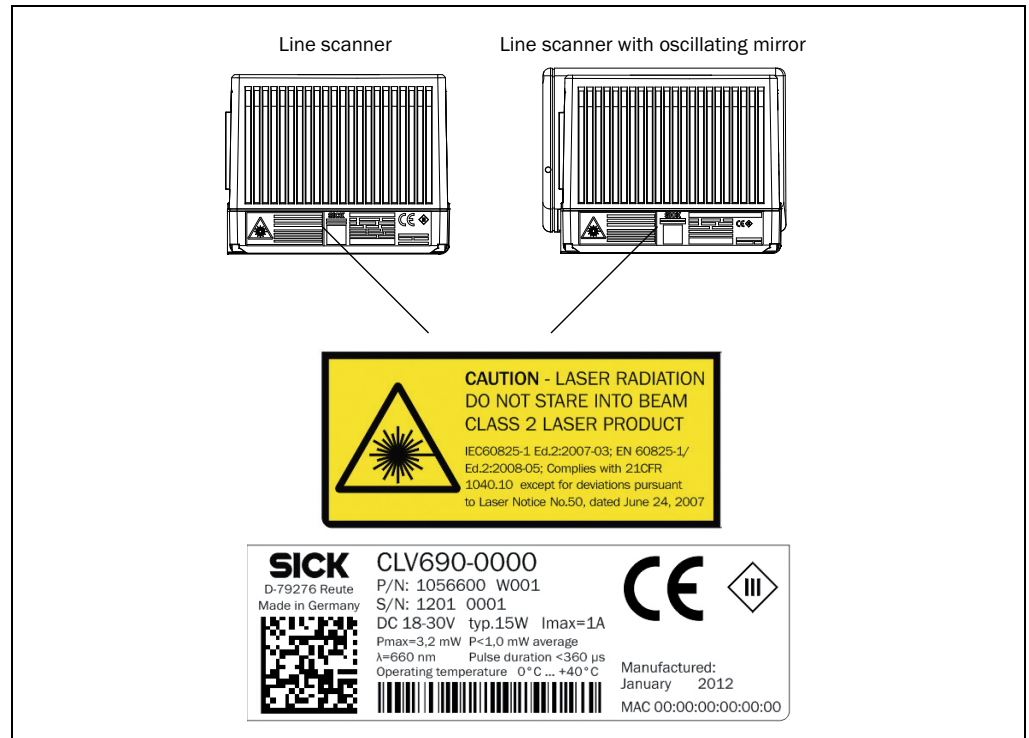


The human eye is not endangered in case of accidental short-term effect of the laser radiation for up to 0.25 s. Intentional extended looking into the laser beam may damage the retina. The exiting radiation is harmless for the human skin.

Caution – other than intended use may cause dangerous irradiation exposure of the user.

- Never look right into the beam path (similar to sunlight)
- Never point the device's laser beam onto the eyes of persons.
- Avoid laser beam reflection by mirror surfaces during mounting and alignment of the CLV69x.
- Do not open the screwed-shut casing of the CLV69x, since this process does not interrupt possible activation of the laser diode.
- Observe applicable provisions on laser protection in its latest version.

Laser warning/laser specifications labels



The CLV69x includes two self-adhesive laser warning labels in German or French to replace if required.

Important No maintenance is required to warrant compliance with laser protection class 2.

Laser diode control

In actual operation (cycled reading operation), the CLV69x switches the laser diode on and off again with the conveyor system trigger signals (object in the reading range). The trigger is provided via the switching inputs of the CLV69x or with a command using one of the data interfaces. A laser timeout that can be set with SOPAS ET (device side ILLUMINATION CONTROL) can automatically switch off the laser diode in case of over-long pending cycle (e.g. conveyor system has stopped) with this type of object trigger control. When the function is activated, the default timeout is 10 min.

In the operating modes "Percentage Evaluation", "Adjusting Mode" and "Show RA limits" to be used only temporarily for configuration/diagnosis, as well as in the cycle type "Auto cycle" (pulse/break ratio can be set), the laser diode is switched on permanently or repeatedly. Activated timeout is ineffective here.

In reading operation, the CLV69x will perform a reference measurement at regular intervals in auto focus mode. For this, the laser diode is switched on for no more than 1 second each. The LED "Laser" at the CLV69x is lit while the laser diode is on.

Table of contents

1	About this document	3
2	Mounting.....	7
2.1	Notes on mounting.....	7
2.2	Optional accessories	7
3	Electrical installation	11
3.1	Overview of all interfaces and connection options	11
3.2	Pin assignments of the cloning plugs.....	12
3.3	Pin assignments and lead color assignments of cables.....	17
3.4	Notes on the electrical installation.....	21
3.5	Prerequisites for the safe operation of the CLV69x in a system	22
3.6	Installation steps	25
3.7	Using the CDM420-0006 connection module.....	30
3.8	Using the CDM490-0001 connection module.....	40
4	Reading field diagrams.....	48
4.1	Reading conditions for all diagrams.....	48
4.2	Overview of reading field diagrams	49

CLV69x

2 Mounting

2.1 Notes on mounting

- The CLV69x should be attached as free from shock and vibration as possible with free view to the objects on the conveyor.

2.2 Optional accessories

2.2.1 Mounting set 1 (part no. 2016110)

clamp clamp profile

part no. 2016110 part no. 20113824

example of use

mm	inch	mm	inch
2.5	0.10	21.0	0.83
5.6	0.22	25.0	0.98
7.6	0.30	30.0	1.18
10.2	0.40	32.5	1.28
11.5	0.45	40.0	1.57
18.0	0.71	50.0	1.97
19.0	0.75	60.0	2.36

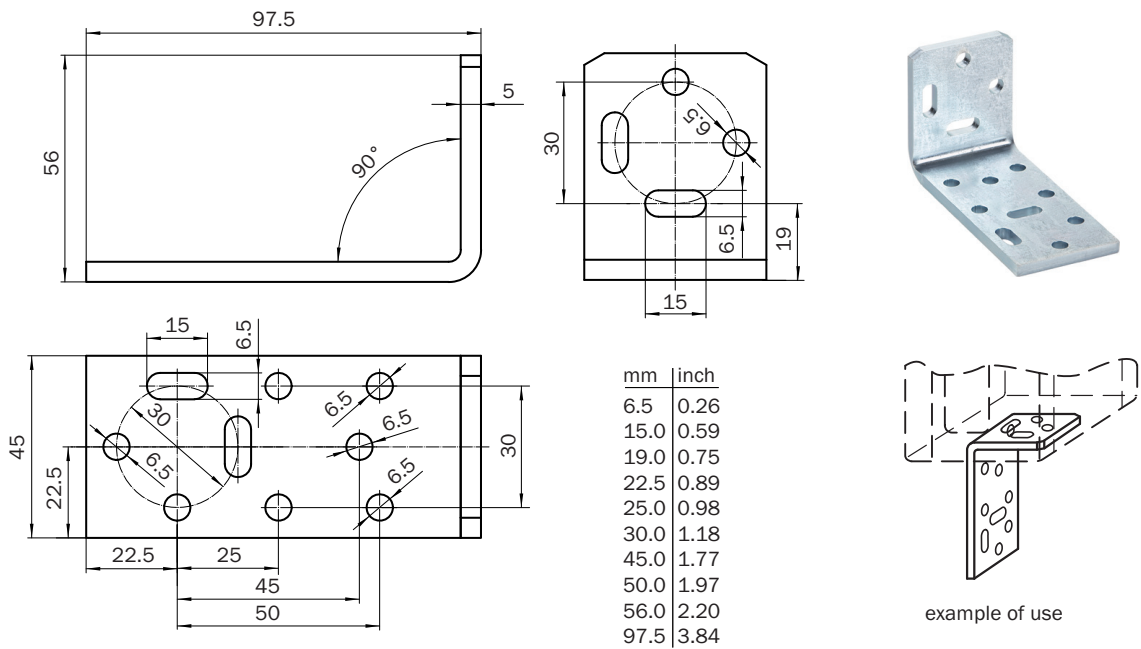
Included:

For mounting CLV69x to quick release clamp:
2 x flat head screw (hexagon socket) M6 x 12 mm for clamp profile

For mounting quick release clamp to holder:
2 x cylinder head screw (hexagon socket) M6 x 16 mm for clamp
2 x washer A6,4
1 x threaded pin M8 x 16 mm

All measures of length in mm

2.2.2 Mounting set 2 (part no. 2013824)

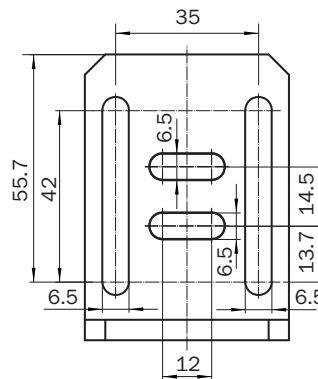
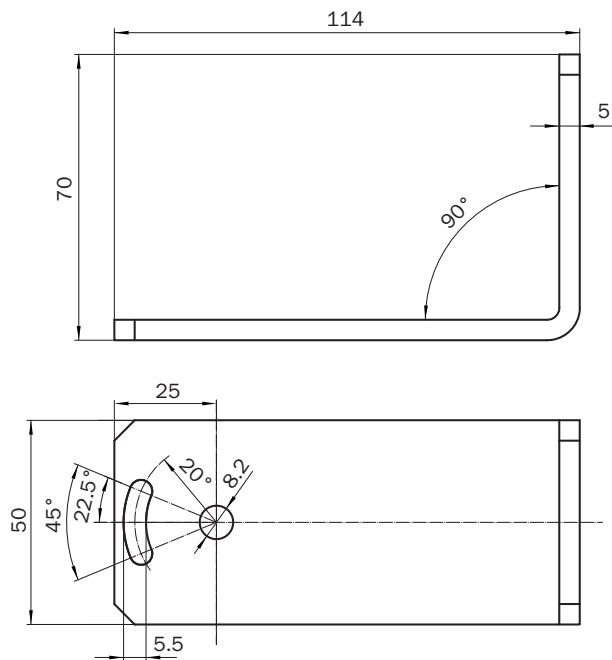


Included to fix CLV69x to the bracket:
2 x cylinder head screw (hexagon socket) M6 x 10 mm, self-locking

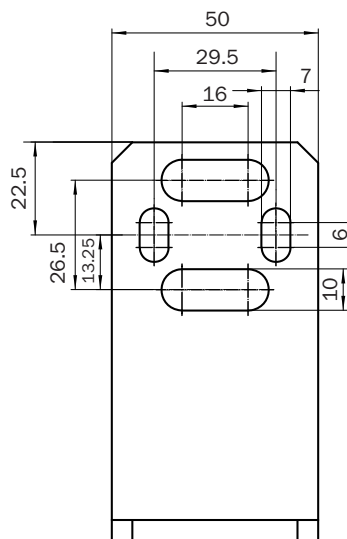
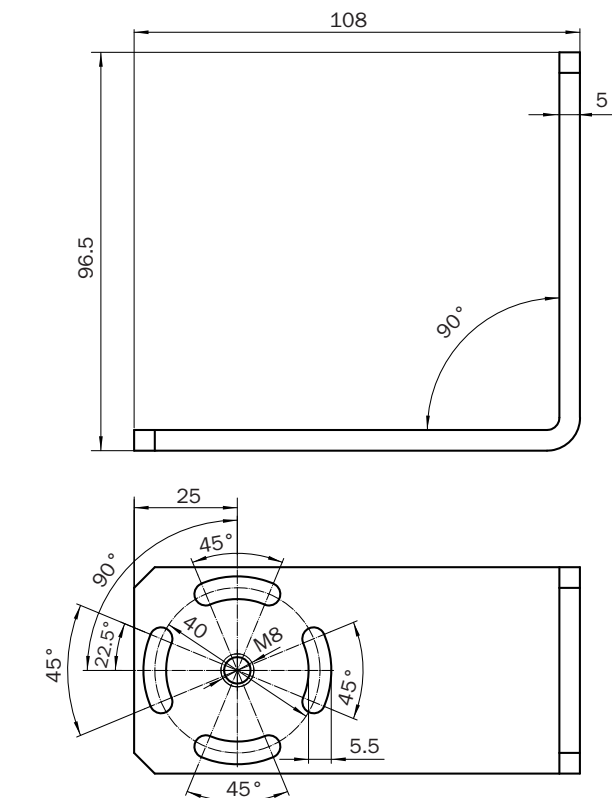
All measures of length in mm

CLV69x

2.2.3 Mounting set 3 (part no. 2018435)



mm	inch
5.00	0.20
5.50	0.22
6.50	0.26
8.20	0.32
12.00	0.47
13.70	0.54
14.50	0.57
25.00	0.98
35.00	1.38
42.00	1.65
50.00	1.97
55.70	2.19
70.00	2.76
114.00	4.49



mm	inch
5.50	0.22
6.00	0.24
7.00	0.28
10.00	0.39
13.25	0.52
16.00	0.63
22.50	0.89
25.00	0.98
26.50	1.04
29.50	1.16
40.00	1.57
50.00	1.97
96.50	3.80
108.00	4.25

Included to fix CLV69x to the bracket:
2 x cylinder head screw (hexagon socket) M6 x 10 mm, self-locking

All measures of length in mm

Mounting the CDM420-0006/CDM490 connection module

The mounting location for the connection module (distance to CLV69x) depends on the physical design of the configuration interface used:

- When connecting via an RS-232 interface (AUX 1, data transmission rate 57.6 kBd):
The max. cable length between CLV69x and CDM420-0006/CDM490 is 3 m (9.84 ft)



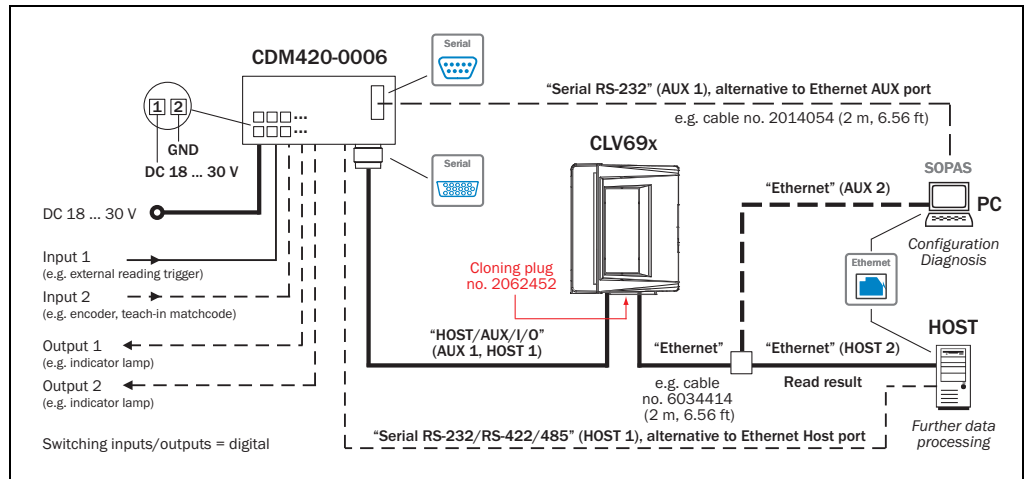
For detailed information on mounting and the electrical installation, please see:

- "CDM420-0006 connection module" operating instructions (part no. 8014808, Ger./Engl. version) e.g. via www.mysick.com/en/CDM
- "CDM490 connection module" operating instructions (part no. 8010005, Ger./Engl. version) e.g. via www.mysick.com/en/CDM

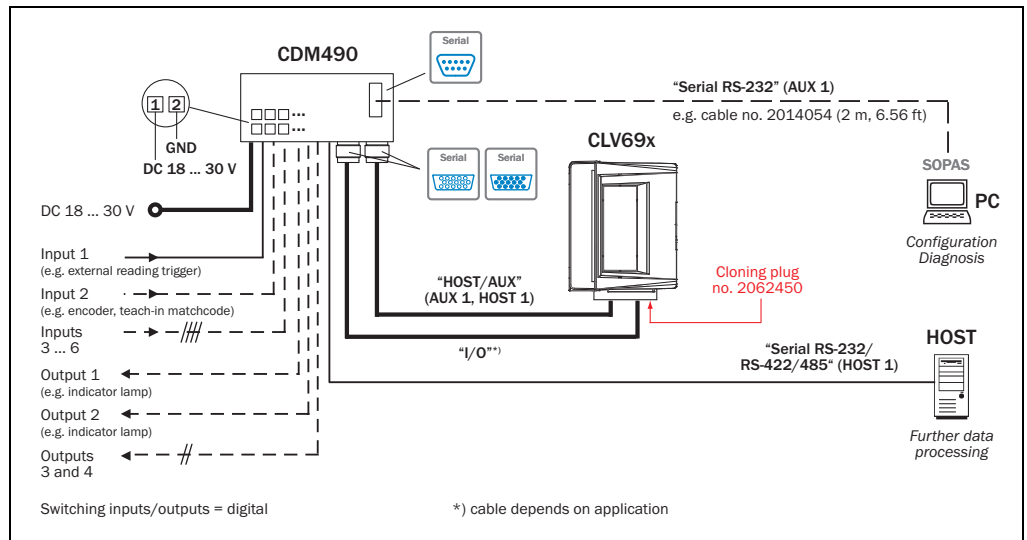
3 Electrical installation

3.1 Overview of all interfaces and connection options

3.1.1 Cloning plug no. 2062452: Application of CDM420-0006 connection module



3.1.2 Cloning plug no. 2062450: Application of CDM490 connection module



3.1.3 Using the data interfaces

Possible interface →	HOST 1	AUX 1	HOST 2	AUX 2
Assignable function ↓	RS-232/ 422/485*)	RS-232	Ethernet	Ethernet
Read result output (format 1)	●	●	●	●
Read result output (format 2)	●	●	●	●
Read diagnosis output (fixed format)		●		●
Monitoring of HOST interface traffic		●		●
Configuration (SOPAS, commands)	○	○	○	○
● = Output of the same function simultaneously possible via the interfaces ○ = Access only makes practical sense via one of the interfaces (risk of collision) *) Selection of one of the physical versions for connection, activation of the driver with SOPAS ET				

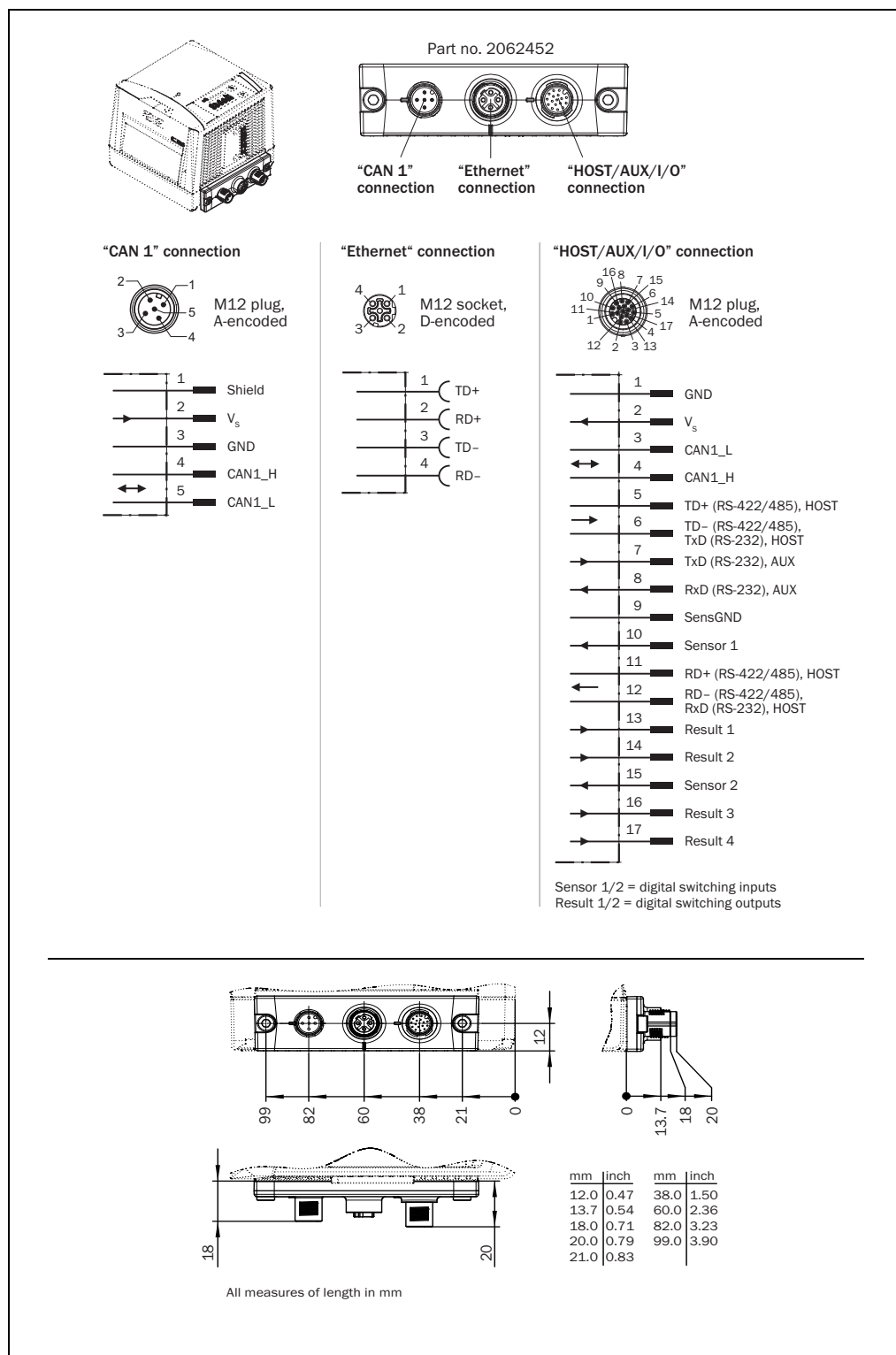
Important Only one of several selectable functions can be allocated to each interface.

3.2 Pin assignments of the cloning plugs

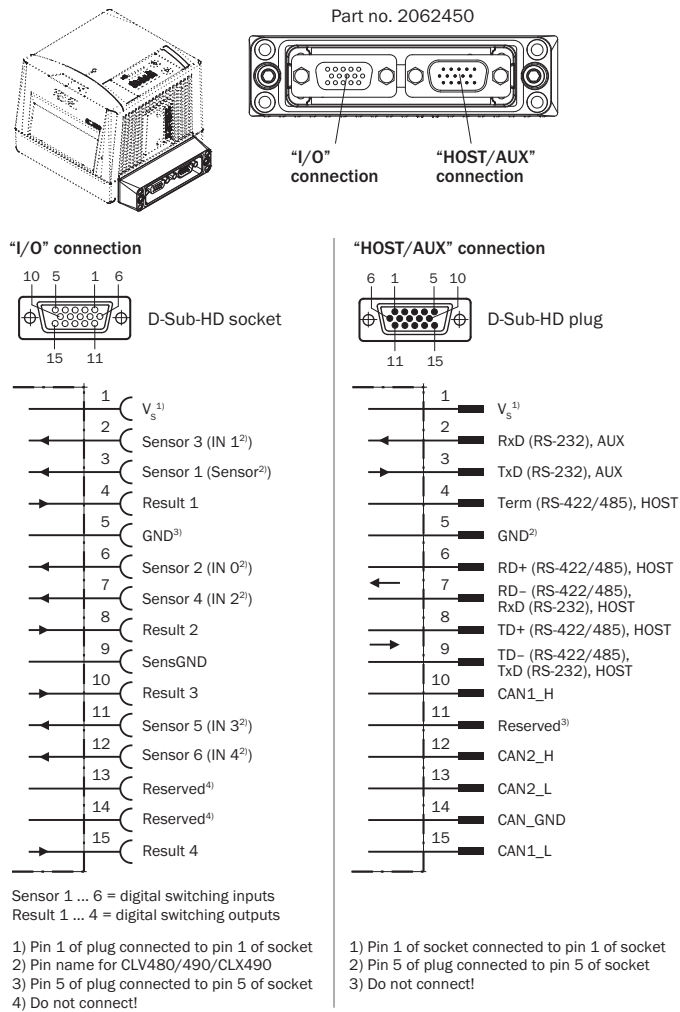
3.2.1 Overview: Data interfaces/switching inputs/outputs of all cloning plugs

Cloning plug			
No. 2062452	No. 2062450	No. 2062453	No. 2062454
Ethernet variant	D-Sub variant	CAN 1 IN/OUT variant	CAN 1/2 variant
3 x M12	2 x D-Sub HD	3 x M12	3 x M12
Sensor 1	Sensor 1 (Sensor)	–	–
Sensor 2	Sensor 2 (IN 0)	–	–
–	Sensor 3 (IN 1)	–	–
–	Sensor 4 (IN 2)	Sensor 4 (IN 2)	Sensor 4 (IN 2)
–	Sensor 5 (IN 3)	–	–
–	Sensor 6 (IN 4)	–	–
Result 1	Result 1	–	–
Result 2	Result 2	–	–
Result 3 ¹⁾	Result 3	–	–
Result 4 ¹⁾	Result 4	–	–
Serial AUX	Serial AUX	Serial AUX	Serial AUX
Serial Host	Serial Host	–	–
CAN 1	CAN 1	CAN 1	CAN 1
–	CAN 2	–	CAN 2
Ethernet	–	–	–
–	–	DC 24 V out ²⁾	DC 24 V out ²⁾
Sensor/IN = switching input; Result = switching output; () = signal name of CLV480/490/CLX490 1) Signal not available on the 15-pin D-Sub-HD plug of the adapter cable no. 2049764, no. 2055419 and no. 2055420 2) For external blower			

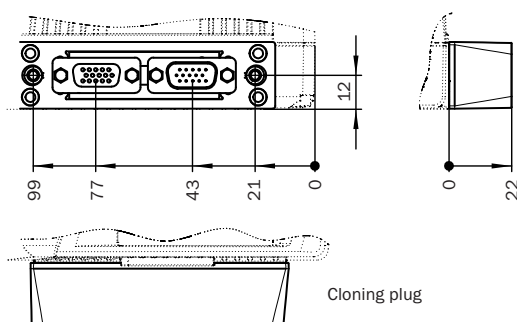
3.2.2 Cloning plug no. 2062452 (M12: Power/Serial Data/I/O/Ethernet/CAN 1)



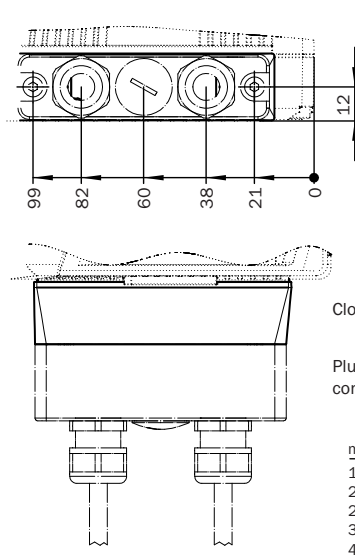
3.2.3 Cloning plug no. 2062450 (D-Sub HD: Power/Serial Data/I/O/CAN 1/2)



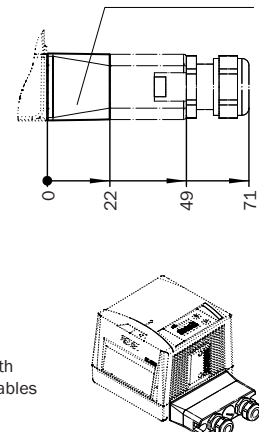
View: cloning plug



View: cloning plug with plug cover

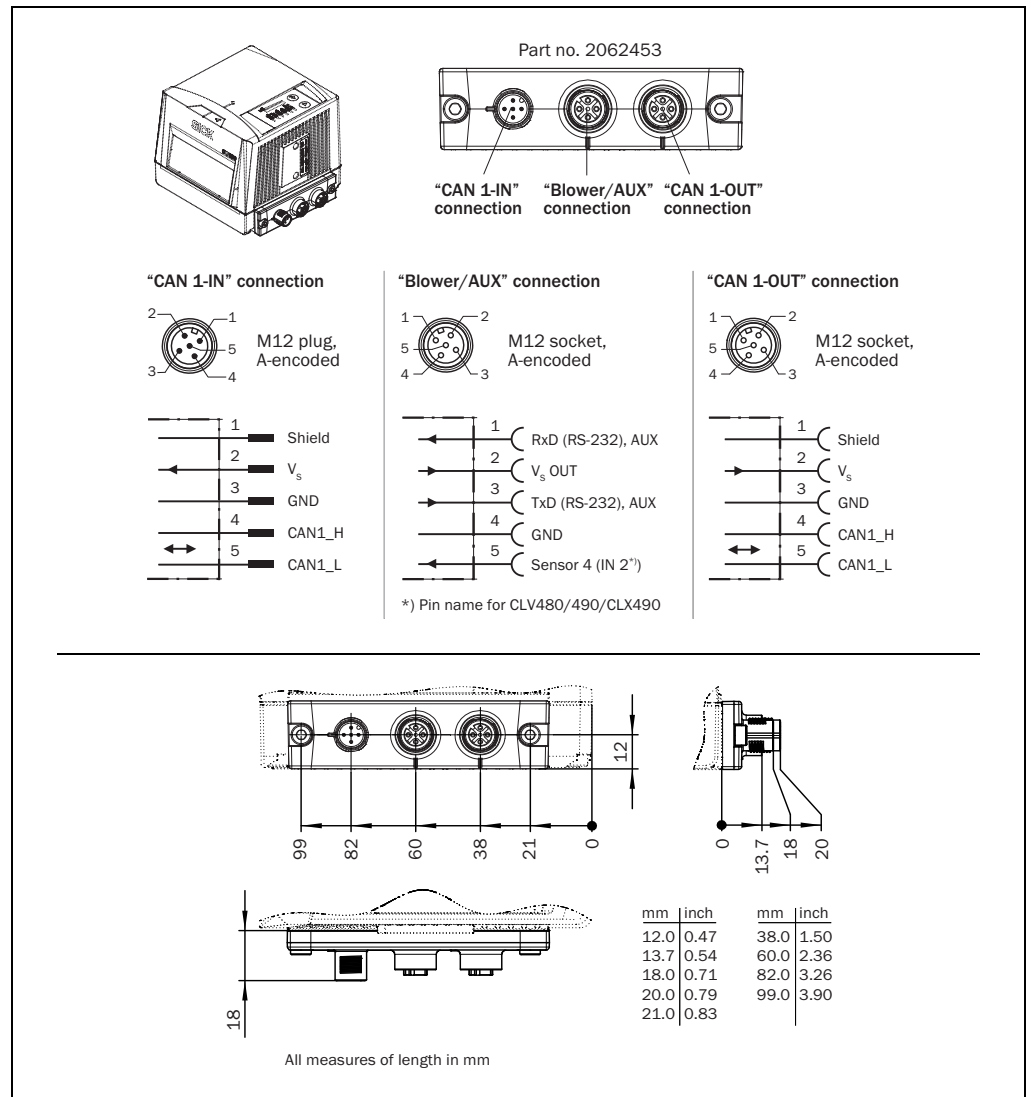


Cloning plug

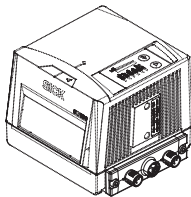


CLV69x

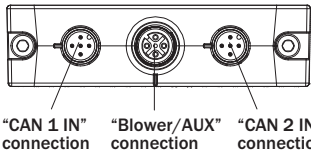
3.2.4 Cloning plug no. 2062453 (M12: Power/Serial AUX/I/CAN 1)



3.2.5 Cloning plug no. 2062454 (M12: Power/Serial AUX/I/CAN 1/2)




Part no. 2062454



"CAN 1 IN" connection "Blower/AUX" connection "CAN 2 IN" connection


"CAN 1 IN" connection



M12 plug, A-encoded

Pin	Signal
1	Shield
2	V _s 1
3	GND
4	CAN1_H
5	CAN1_L


"Blower/AUX" connection



M12 socket, A-encoded

Pin	Signal
1	RxD (RS-232), AUX
2	V _s OUT Blower
3	TxD (RS-232), AUX
4	GND
5	Sensor 4 (IN 2")

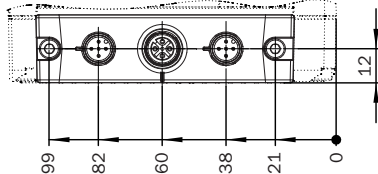
"CAN 2 IN" connection



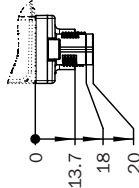
M12 plug, A-encoded

Pin	Signal
1	Shield
2	V _s 2
3	GND
4	CAN2_H
5	CAN2_L

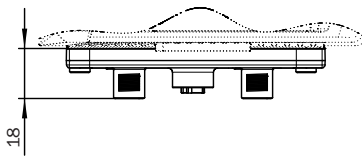
*) Pin name for CLV480/490/CLX490



99 82 60 38 21 0



0 13.7 18 20



18

mm	inch	mm	inch
12.0	0.47	38.0	1.50
13.7	0.54	60.0	2.36
18.0	0.71	82.0	3.23
20.0	0.79	99.0	3.90
21.0	0.83		

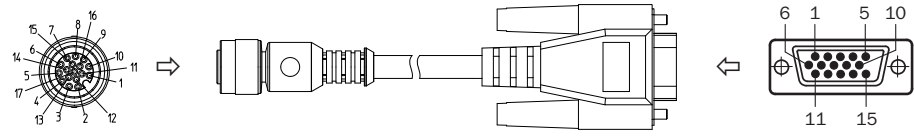
All measures of length in mm

3.3 Pin assignments and lead color assignments of cables

3.3.1 Cloning plug no. 2062452 (3 x M12)

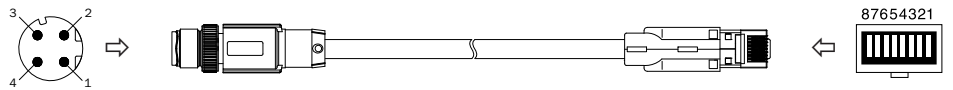
"HOST/AUX/I/O" connection, reduced to 15-pin D-Sub HD plug via adapter cable

Adapter cable no. 2049764 (0.9 m/2.95 ft), no. 2055419 (2 m/6.56 ft), no. 2055420 (3 m/9.84 ft)

 <div style="display: flex; justify-content: space-between; width: 100%;"> <div style="text-align: center;"> <p>M12 socket, A-type encoded Front view</p> </div> <div style="text-align: center;"> <p>D Sub HD plug Front view</p> </div> </div>			
Pin	Signal	Function	Pin
2	DC 12 ... 30 V	Supply voltage	1
8	RxD (RS-232), AUX	Aux interface (receiver)	2
7	TxD (RS-232), Aux	Aux interface (sender)	3
15	Sensor 2	Switching input 2	4
1	GND	Ground	5
11	RD+ (RS-422), Host	Host interface (receiver+)	6
12	RD- (RS-422)/RxD (RS-232), Host	Host interface (receiver-)	7
5	TD+ (RS-422), Host	Host interface (sender+)	8
6	TD- (RS-422)/TxD (RS-232), Host	Host interface (sender-)	9
4	CAN_H	CAN bus 1 (IN/OUT)	10
3	CAN_L	CAN bus 1 (IN/OUT)	11
13	Result 1	Switching output 1	12
14	Result 2	Switching output 2	13
10	Sensor 1	Switching input 1	14
9	SensGND	Common ground for all switching inputs	15
16	n.c.	-	-
17	n.c.	-	-

"Ethernet" connection" to PC

Cable no. 6034414 (2 m/6.56 ft), no. 6034415 (5 m/16.4 ft)

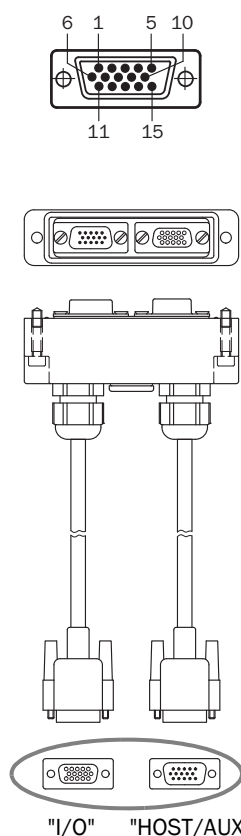
 <div style="display: flex; justify-content: space-between; width: 100%;"> <div style="text-align: center;"> <p>M12 plug, D-type encoded Front view</p> </div> <div style="text-align: center;"> <p>RJ-45 plug Front view</p> </div> </div>			
Pin	Signal	Function	Pin
1	TD+ (Ethernet)	Sender+	1
3	TD- (Ethernet)	Sender-	2
2	RD+ (Ethernet)	Receiver+	3
4	RD- (Ethernet)	Receiver-	6

3.3.2 Cloning plug no. 2062450 (2 x D-Sub HD), with additional plug cover

Enclosure rating of connections on the cloning plug: IP 65

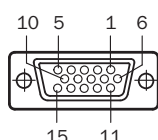
Cable no. 2020307 (each 3 m/9.84 ft)

15-pin D-Sub HD cable plug ("HOST/AUX" connection)



Cable 15-pin plug	Signal	Function	Plug cover 15-pin socket
1	V _s	Supply voltage	1
2	RxD (RS-232), Aux	Aux interface (receiver)	2
3	TxD (RS-232), Aux	Aux interface (sender)	3
4	Term (RS-422/485)	Termination of host interface	4
5	GND	Ground	5
6	RD+ (RS-422/485), Host	Host interface (receiver+)	6
7	RD- (RS-422/485), Host RxD (RS-232), Host	Host interface (receiver-)	7
8	TD+ (RS-422/485), Host	Host interface (sender+)	8
9	TD- (RS-422/485), Host TxD (RS-232), Host	Host interface (sender-)	9
10	CAN H (CAN1_H)	CAN bus 1 (IN/OUT)	10
11	Reserved	Do not use!	11
12	CAN2 H	CAN bus 2 (IN/OUT)	12
13	CAN2 L	CAN bus 2 (IN/OUT)	13
14	CAN_GND	Ground CAN bus	14
15	CAN L (CAN1_L)	CAN bus 1 (IN/OUT)	15
Housing	-	Shield	Housing

15-pin. D-Sub HD cable socket ("I/O" connection)

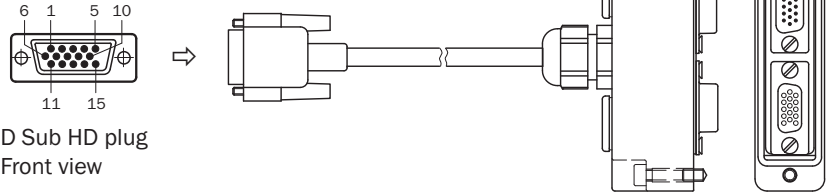


Cable 15-pin socket	Signal	Function	Plug cover 15-pin plug
1	V _s	Supply voltage	1
2	Sensor 3 (IN 1)	Switching input 3	2
3	Sensor 1 (Sensor)	Switching input 1	3
4	Result 1	Switching output 1	4
5	GND	Ground	5
6	Sensor 2 (IN 0)	Switching input 2	6
7	Sensor 4 (IN 2)	Switching input 4	7
8	Result 2	Switching output 2	8
9	INGND	Common ground for all switching inputs	9
10	Result 3	Switching output 3	10
11	Sensor 5 (IN 3)	Switching input 5	11
12	Sensor 6 (IN 4)	Switching input 6	12
13	Reserved	Do not use!	-
14	Reserved	Do not use!	-
15	Result 4	Switching output 4	15
Housing	Shield	Shield	Housing

"HOST/AUX" and "I/O" connections, reduced to 15-pin D-Sub HD plug via adapter cable

Adapter cable no. 2027046 (3 m/9.84 ft)

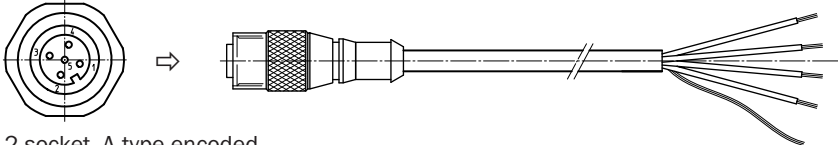
Pin assignment of 15-pin D-Sub HD cable plug

 <p>D Sub HD plug Front view</p>				
15-pin plug	Signal	Function	Plug cover 15-pin plug	15-pin socket
1	V _s	Supply voltage	–	1
2	RxD (RS-232), Aux	Aux interface (receiver)	–	2
3	TxD (RS-232), Aux	Aux interface (sender)	–	3
4	IN 0	Switching input 2	6	–
5	GND	Ground	–	5
6	RD+ (RS-422/485), Host	Host interface (receiver+)	–	6
7	RD– (RS-422/485), Host RxD (RS-232), Host	Host interface (receiver–)	–	7
8	TD+ (RS-422/485), Host	Host interface (sender+)	–	8
9	TD– (RS-422/485), Host TxD (RS-232), Host	Host interface (sender–)	–	9
10	CAN H	CAN bus 1 (IN/OUT)	–	10
11	CAN L	CAN bus 1 (IN/OUT)	–	15
12	Result 1	Switching output 1	4	–
13	Result 2	Switching output 2	8	–
14	Sensor 1	Switching input 1	3	–
15	INGND	Common ground for all switching inputs	9	–
Housing	–	Shield	Housing	

Important The following signals are not available on the 15-pin D-Sub HD cable plug: "IN 1 ... IN 4", "Result 3" and "Result 4" as well as "Term (RS-422/485)" of the "HOST/TERM" and "I/O" connections of the cloning plug.

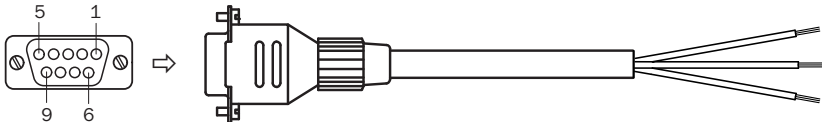
3.3.3 CDM420-0006/CDM490 connection module to CAN network

No. 6021166 (5 m/16.4 ft)

 <p>M12 socket, A-type encoded Front view</p>			
Pin	Signal	Function	Color of lead
1	-	Shield	-
2	DC +24 V	Supply voltage	Red
3	GND	Ground	Black
4	CAN H	CAN bus (IN/OUT)	White
5	CAN L	CAN bus (IN/OUT)	Blue

3.3.4 CDM420-0006/CDM490 connection module to PC (serial data: Host interface)

No. 2020319 (3 m/9.84 ft)

 <p>D Sub socket Front view</p>					
Pin	Signal	Function	Color of lead	CDM420-0006 terminal	CDM490 terminal
1	-	-	-	-	-
2	RxD (RS-232)	Host interface (receiver)	Brown	34 (TxD Host)	34 (TxD Host)
3	TxD (RS-232)	Host interface (sender)	Blue	35 (RxD Host)	35 (RxD Host)
4	-	-	-	-	-
5	GND	Ground	Black	36 (GND)	36 (GND)
6	-	-	-	-	-
7	-	-	-	-	-
8	-	-	-	-	-
9	-	-	-	-	-

3.4 Notes on the electrical installation

- Electrical connections between the CLV69x and other devices may only be connected or disconnected when the system is not live, otherwise the devices may be damaged.
- Perform any circuits connected to the CLV69x (e.g. switching inputs with external powered sensors) as SELV circuits (**S**afety **E**xtra **L**ow **V**oltage).
- Do not switch on the supply voltage for the CLV69x/the CDM420-0006/CDM490 connection module until the connection work has been completed and the wiring work has been tested thoroughly.

Prerequisites for enclosure rating IP 65

- Important**
- The cloning plug has to be screwed onto the housing.
 - To reach enclosure rating IP 65, the cloning plug no. 2062450 (2 x 15-pin D-Sub plug-in connections) has to be covered additionally with a plug cover, e.g. no. 2020307.
 - The electrical connections of the cloning plug not used have to be fitted with protective caps/plugs.

Cable lengths

The possible length of cable between CLV69x and the host computer depends on the selected physical design of the host interface and the set data transmission rate. For the serial interfaces, see [Chapter 3.6.5 Wiring serial data interfaces, Page 27](#).

3.5 Prerequisites for the safe operation of the CLV69x in a system

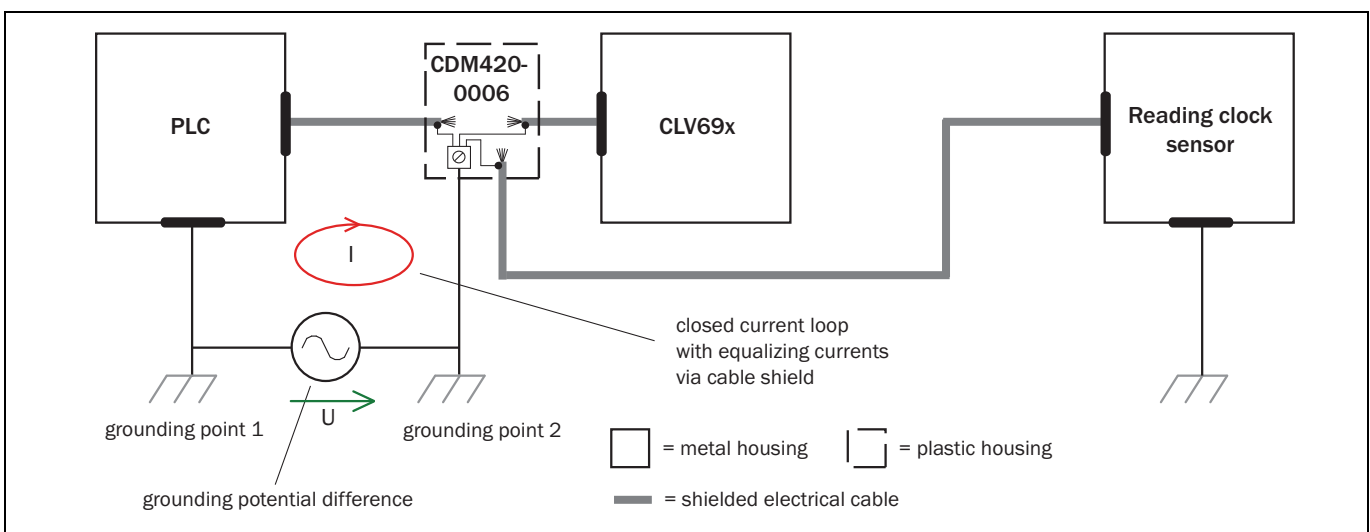
The CLV69x is designed and tested for electrical safety according to EN 60950-1: 2011-01 (corresponds to EN 60950-1: 2006-04 + A11: 2009-03 + A1: 2010). It is connected to the peripheral devices (power supply, reading pulse sensor(s), PLC, Host etc.) via shielded cables. The cable shield, for example, for the data cable rests against the metal housing of the CLV69x. The device can either be grounded through the cable shield or through one of the blind hole threads on the side.

If the peripheral devices have metal housings and if the cable shields also lie on their housings, it is assumed that all devices involved in the installation have the **same ground potential**.

This is achieved for instance by complying with the following conditions:

- Mounting the devices on conductive metal surfaces
- Correctly grounding the devices/metal surfaces in the system
- If necessary, low-impedance and current carrying equipotential bonding between areas with different ground potentials.

If these conditions are not met, e.g. on devices in a widely distributed system over several buildings, potential equalization currents may, due to different ground potentials, flow along the cable shields between the devices, which can lead to hazards.



DANGER

Risk of injury/risk of damage via electrical current!

Potential equalization currents between the CLV69x and other grounded devices in the system can have the following effects:

- Dangerous voltages on the metal housing of the CLV69x, for instance
 - Incorrect function or irreparable damage to the devices
 - Damage/irreparable damage of the cable shield due to heating and cable fires
- Where local conditions are unfavorable and thus do not meet conditions for a safe earthing method (same ground potential at all grounding points), take measures in accordance with the following formats.

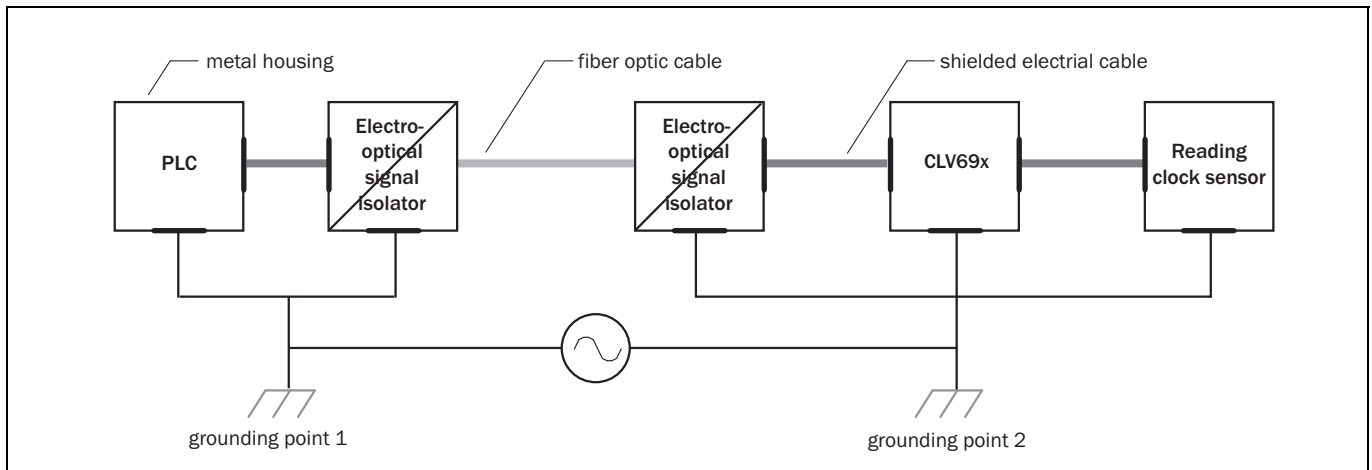
Remedial measures

The most common solution to prevent potential equalization currents on cable shields is to ensure low-impedance and current carrying equipotential bonding. If this is not possible, the following solution approaches serve as a suggestion.

Important We expressly advise against opening up the cable shields. Doing this means that the EMC limit values can no longer be complied with and that the safe operation of the device data interfaces can no longer be guaranteed.

a) Measures for widely distributed system installations

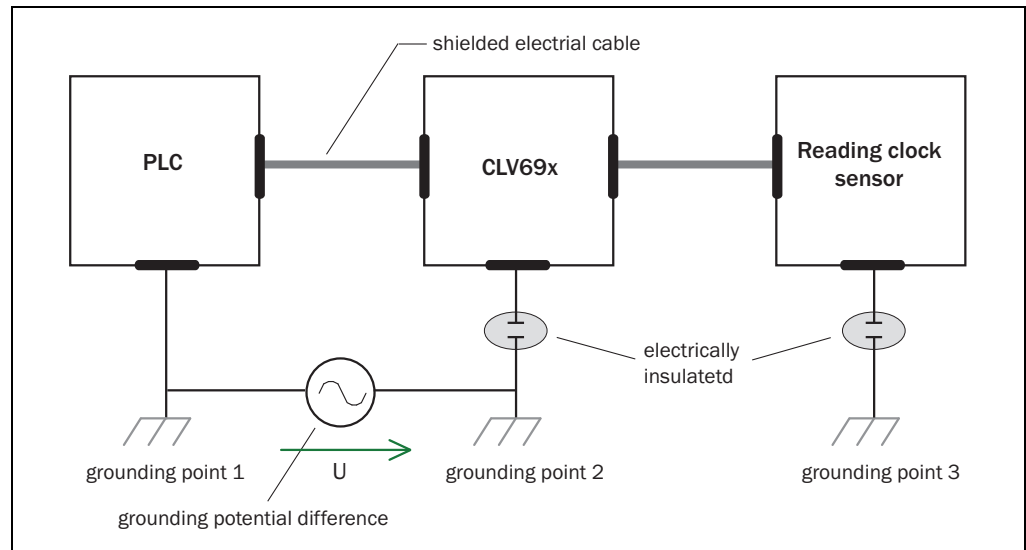
On widely distributed system installations with correspondingly large potential differences, we recommend setting up local islands and connecting them using commercially available **electro-optical signal isolators**. This measure achieves a high degree of resistance to electromagnetic interference while at the same time complying with all the requirements of EN 60950-1.



The ground loop is isolated by using the electro-optical signal isolator between the islands. Within the islands, a stable equipotential bonding prevents equalizing currents at the cable shields.

b) Measures for small system installations

For smaller installations with only slight potential differences, insulated installation of the CLV69x and of peripheral devices may be a sufficient solution.



Even in the event of large differences in the ground potential, ground loops are effectively prevented, meaning that equalizing currents can no longer flow via the cable shields and metal housing.

Important The power supply for the CLV69x and the connected peripheral devices must also guarantee the required level of insulation.

Under certain circumstances, a tangible potential can develop between the insulated metal housings and the local ground potential.

Special national regulations for Sweden and Norway



Varning och atjarder

Utrustning som ar kopplad till skyddsjord via jordat vagguttag och/eller via annan utrustning och samtidigt ar kopplad till kabel-TV nat kan i vissa fall medfora risk for brand.

- For att undvika detta skall vid anslutning av utrustningen till kabel-TV nat galvanisk isolator finnas mellan utrustningen och kabel-TV natet.



Advarsel og tiltaker

Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr - og er tilkoplet et kabel - TV nett, kan forarsake brannfare.

- For a unnga dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel-TV nettet.

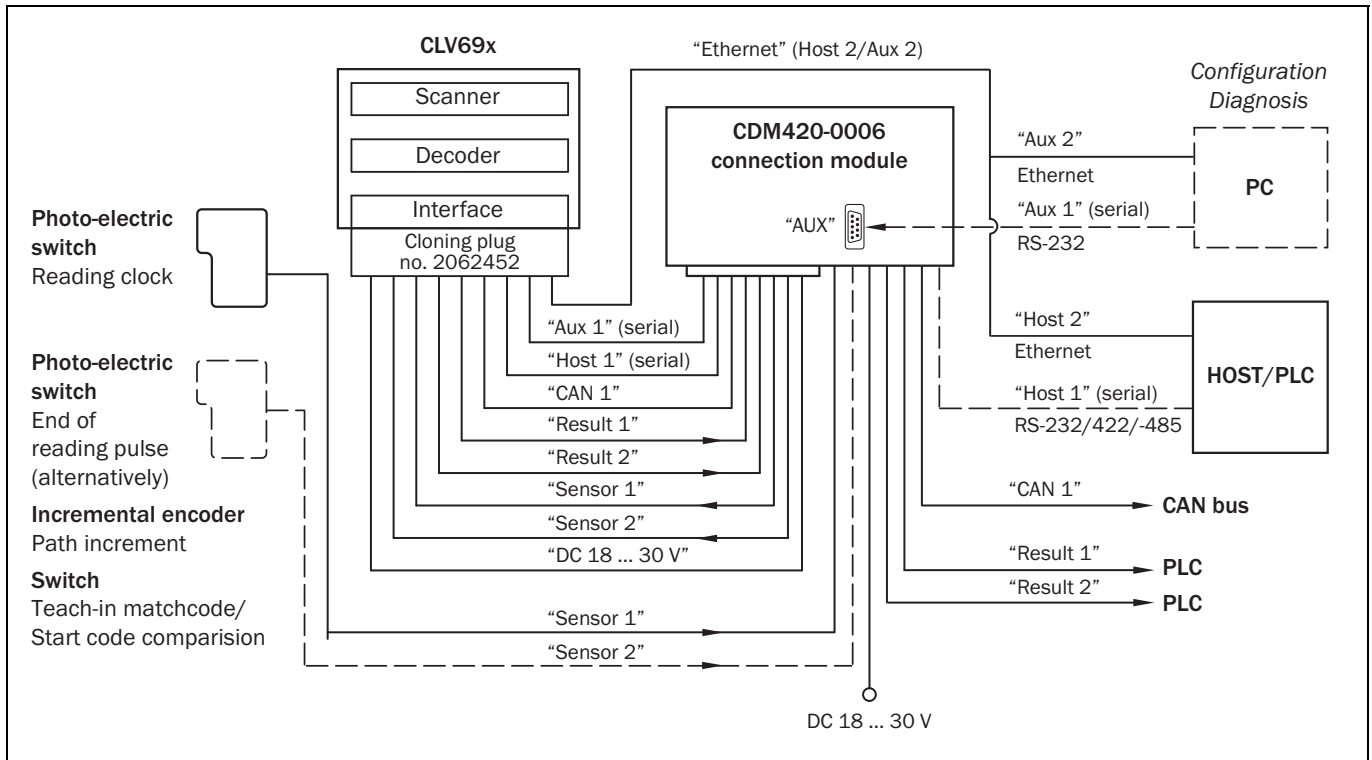
Corresponding English translation

Devices which are connected to the electrical system PE of the building via a mains connection or other devices with a connection to the PE, and which are connected to a cable distribution system with coaxial cables, can under certain circumstances cause a risk of fire.

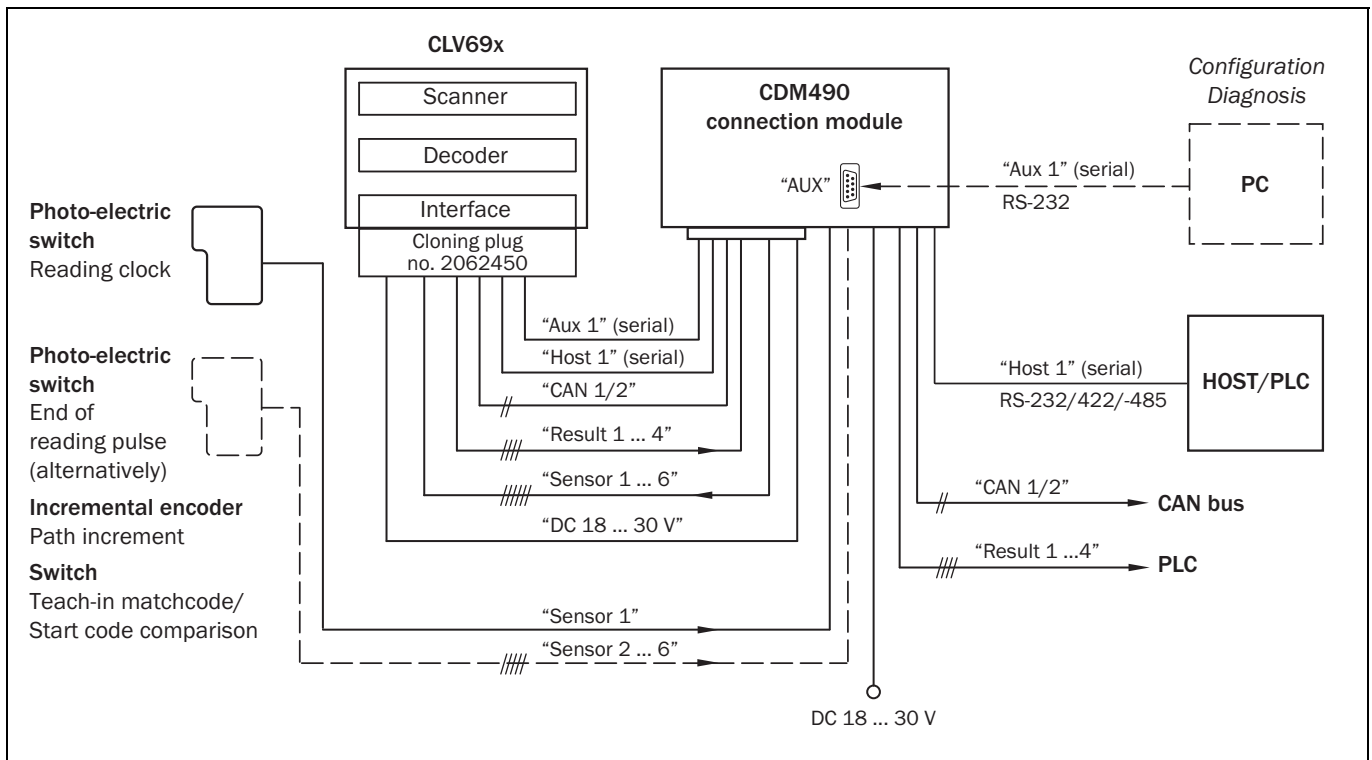
- Connections to a cable distribution system must therefore be made such that electrical insulation is offered below a certain frequency range (galvanic separating link).

3.6 Installation steps

3.6.1 Block diagram: wiring the CDM420-0006 connection module



3.6.2 Block diagram: wiring the CDM490 connection module





The commissioning/configuration of the connection modules as well as the technical data are described in the:

- "CDM420-0006 connection module" operating instructions (part no. 8014808, Ger./Engl. version).
- "CDM490 connection module" operating instructions (part no. 8010005, Ger./Engl. version).

3.6.3 Connecting the supply voltage

The CLV69x requires a power supply unit with the following characteristics:

- Supply voltage DC 18 ... 30 V (stabilized function extra-low voltage [SELV] according to the IEC 60364-4-41 standard [VDE 0100 Teil 410]).
- The power source must be able to provide at least 144 W output or max. 6 A. The activation current of the CLV69x is max. 5.5 A for 1 to 2 ms (depending on the length of the supply cable).



DANGER

Risk of injury via electrical current!

If the supply voltage is produced by the removal and conversion of electricity from the AC mains power supply with the aid of a power supply unit, then insufficient electrical separation between the input and output circuit may lead to an electric shock.

- Only use one power supply unit whose output circuit has safe electrical separation from the input circuit by means of double insulation and a safety transformer in accordance with IEC 742 (VDE 0551)

Protection of supply cables

To ensure protection against short-circuits/overload in the supply cables from the customer's power system, the conductor cross sections used have to be selected and protected according to the national standards.

The supply voltage is fed via the connection module (see [Chapter 3.8.2 Wiring overview, part 2 \(I/O board right-hand side on top\), one switching input used, Page 41](#) respectively [Chapter 3.8.3 Wiring the supply voltage in the CDM490-0001 connection module, Page 42](#)).

The CDM420-0006 and the CDM490 connection modules have each one fuse (2 A slow blow) in the electrical circuit downstream of the S1 switch.

Wiring without SICK connection module

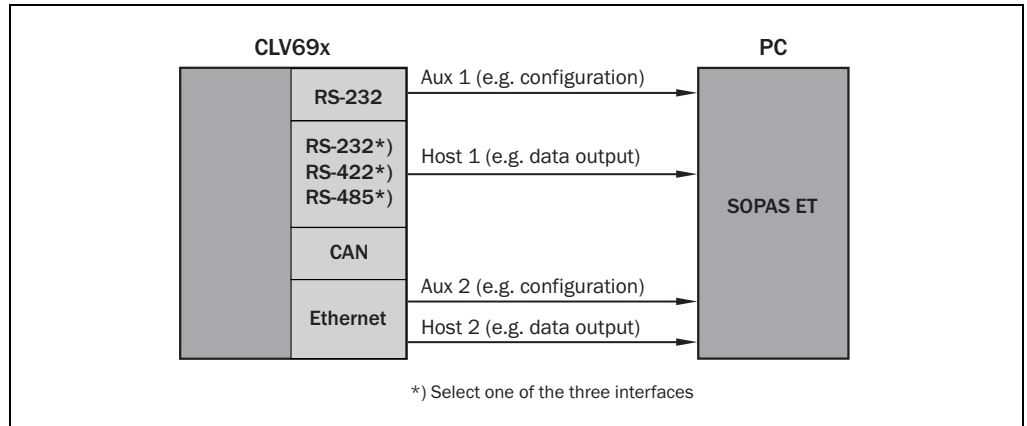
A connecting cable with 17-pin D-Sub HD socket and open cable end can be used for wiring the CLV69x without CDM420-0006 connection module.

The CLV69x without heater must then be protected using a separate 2 A slow blow fuse, in the supplying circuit at the start of the supply cable.

3.6.4 Wiring the Ethernet interface

Cloning plug no. 2062452 (3 x M12) only:

1. Connect the CLV69x to the PC via an Ethernet cable.
2. Set up communication via SOPAS ET configuration software.



Important The Ethernet interface for the CLV69x has an Auto-MDIX function. This automatically adjusts the transmission speed as well as any necessary crossover connections.

3.6.5 Wiring serial data interfaces

Cloning plug no. 2062452, no. 2062450, no. 2062453, no. 2062454:

The maximum data transmission rate for the serial interface depends on the cable length and on the type of interface. The following recommendations apply:

Type of interface	Data transmission rate	Distance to the target computer (Host)
RS-232	Up to 19.2 kBd 38.4 ... 57.6 kBd 115.2 ... 500 kBd	Max. 10 m (32.8 ft) Max. 3 m (9.84 ft) Max. 2 m (6.56 ft)
RS-422/485 ¹⁾	Up to 38.4 kBd 38.4 to 57.6 kBd 57.6 ... 500 kBd	Max. 1,200 m (3,927 ft) Max. 500 m (1,640 ft) Max. 200 m (656,16 ft)
1) with RS-232/485-capable cable and the according cable termination as per specification		

NOTICE

Damage to the internal interface module

If the serial data interfaces are wired incorrectly, then electronic components of the CLV69x could get damaged.

- Observe the information on wiring.
- Carefully check the wiring prior to switching on the CLV69x.

Cloning plug no. 2062452 (3 x M12):

The wiring is done using the **CDM420-0006 connection module**; for more on this, see:

- [Chapter 3.7.3 Wiring the RS-232 serial host data interface in the CDM420-0006 connection module, Page 32](#)
- [Chapter 3.7.4 Wiring the RS-422 serial host data interface in the CDM420-0006 connection module, Page 33](#)

- [Chapter 3.7.5 Wiring the RS-485 serial host data interface in the CDM420-0006 connection module, Page 34](#)

Cloning plug no. 2062450 (2 x D-Sub HD):

The wiring is done using the **CDM490 connection module**; for more on this, see:

- [Chapter 3.8.4 Wiring the RS-232 serial host data interface in the CDM490-0001 connection module, Page 43](#)
- [Chapter 3.8.5 Wiring the RS-422 serial host data interface in the CDM490-0001 connection module, Page 43](#)
- [Chapter 3.8.6 Wiring the RS-485 serial host data interface in the CDM490-0001 connection module, Page 44](#)

Recommendation

- Use shielded data cables (twisted pair leads).
- To prevent interference factors, do not lay data cables over a longer route in parallel with power supply cables and motor cables, in cable channels, for example.

Termination of the RS-422 data interface

Termination can be implemented in the CDM420-0006/CDM490 connection module. See "CDM420-0006" or "CDM490" connection module" operating instructions.

3.6.6 Wiring the CAN interface

Cloning plug no. 2062452 (3 x M12):

Wiring is either directly via the connection at the cloning plug (M12-plug), if required including termination, or via the **CDM420-0006 connection module**.

Please see [Chapter 3.7.6 Wiring the CAN interface in the CDM420-0006 connection module, Page 35](#).

Cloning plug no. 2062450 (2 x D-Sub HD):

The wiring is done using the **CDM490 connection module**. For more on this, see

[Chapter 3.8.7 Wiring the CAN interface in the CDM490-0001 connection module, Page 45](#)

Cloning plug no. 2062453 (3 x M12), no. 2062454 (3 x M12):

Wiring is via the corresponding M12 connection/s of the cloning plug.

3.6.7 Wiring the switching inputs

Cloning plug	Number of switching inputs
No. 2062452	2
No. 2062450	6
No. 2062453	1
No. 2062454	1

The switching inputs "Sensor 1" to "Sensor 6" can be used for starting and/or finishing of the reading pulse or to feed in an incremental signal.

Cloning plug no. 2062452 (3 x M12):

2 switching outputs are available at the adapter cable with the 15-pin D-Sub-HD plug and at the cable with open cable end.

The wiring of the switching inputs is done using the **CDM420-0006 connection module**; for more on this, see:

- [Chapter 3.7.7 Wiring the "Sensor 1" switching input in the CDM420-0006 connection module, Page 36](#)
- [Chapter 3.7.8 Wiring the "Sensor 2" switching input in the CDM420-0006 connection module, Page 37](#)

Cloning plug no. 2062450 (2 x D-Sub HD):

When using connecting cables 1:1 to the connections, all 6 switching inputs are available. The wiring of the switching inputs is done using the **CDM490 connection module**; for more on this, see:

- [Chapter 3.8.8 Wiring the "Sensor 1 ... 6" switching inputs in the CDM490-0001 connection module, Page 46](#)

3.6.8 Wiring the switching outputs

Cloning plug	Number of switching outputs
No. 2062452	4
No. 2062450	4
No. 2062453	–
No. 2062454	–

The switching outputs "Result 1" to "Result 4" can be assigned different functions for result status output independently from each other. If the assigned event occurs in the reading process, the corresponding switching output will become live for the selected impulse duration after the end of the clock reading pulse.

Cloning plug no. 2062452 (3 x M12):

2 switching outputs are available at the adapter line with 15-pin D-Sub-HD-plug, and for cables with open cable end, all 4 switching outputs are available.

Important

Capacitive loads on the switching outputs have an effect on the switch-on and switch-off behavior. The maximum capacity of 100 nF is a limit value.

The wiring of the switching outputs is done using the **CDM420-0006 connection module**; for more on this, see:

- [Chapter 3.7.9 Wiring the "Result 1" switching output in the CDM420-0006 connection module, Page 38](#)
- [Chapter 3.7.10 Wiring the "Result 2" switching output in the CDM420-0006 connection module, Page 39](#)

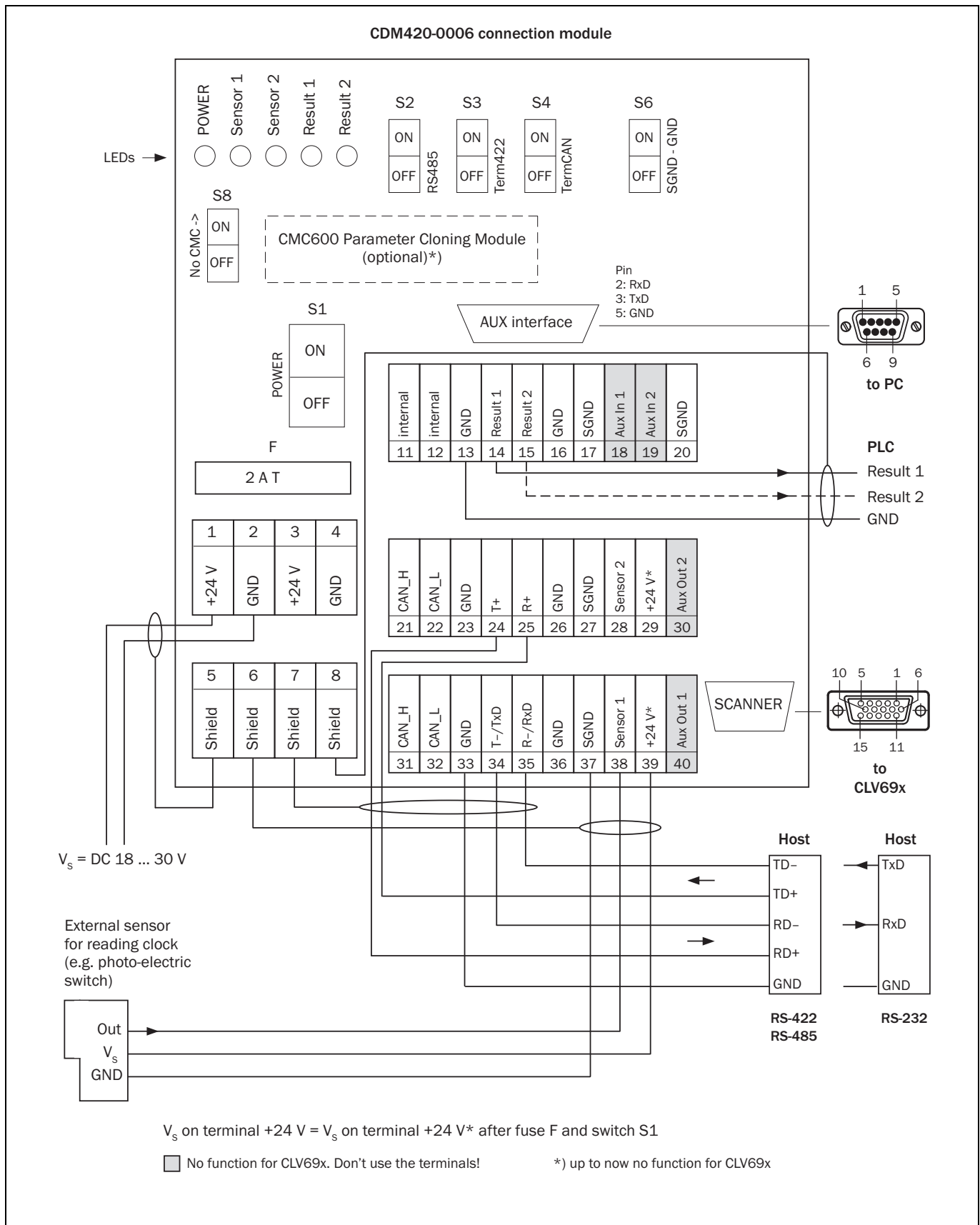
Cloning plug no. 2062450 (2 x D-Sub HD):

When using connecting cables 1:1 to the connections, all 4 switching outputs are available. The wiring of the switching outputs is done using the **CDM490 connection module**; for more on this, see:

- [Chapter 3.8.9 Wiring the "Result 1 ... 4" switching outputs in the CDM490-0001 connection module, Page 47](#)

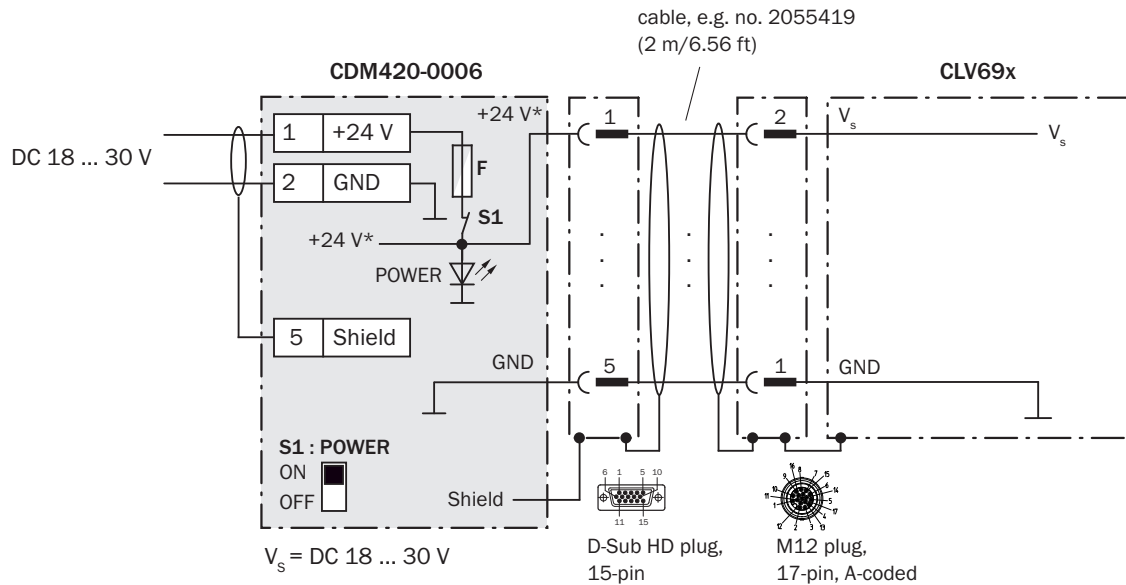
3.7 Using the CDM420-0006 connection module

3.7.1 Wiring overview (one switching input used)



CLV69x

3.7.2 Wiring the supply voltage in the CDM420-0006 connection module



V_s on terminal +24 V = V_s on terminal +24 V* after fuse F and switch S1

Switch S1:

ON:

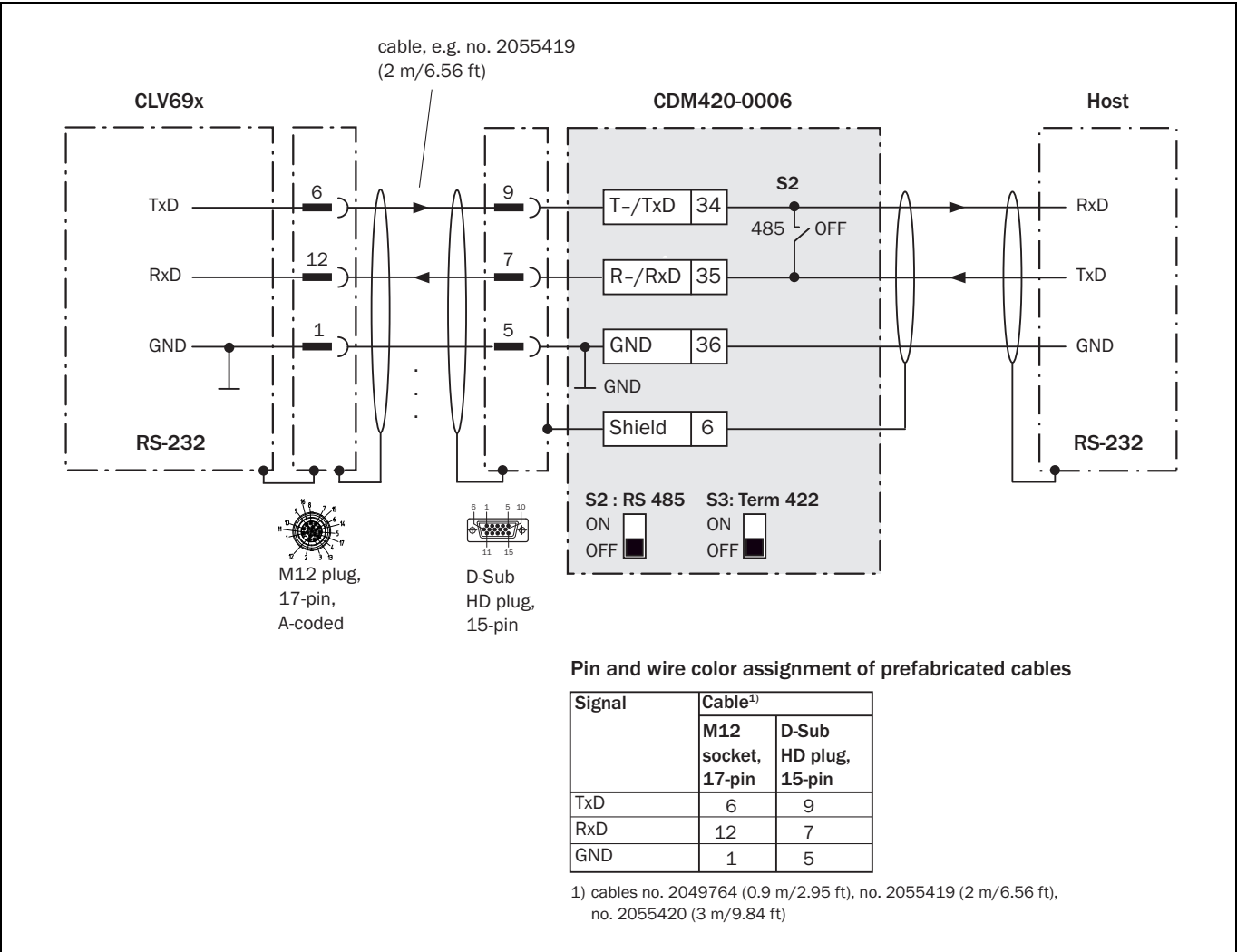
Power supply voltage V_s (+24 V) switched to V_s (+24 V*) via fuse to CDM420-0006 and CLV69x.

V_s (+24 V*) additionally available on terminals 29 and 39.

OFF:

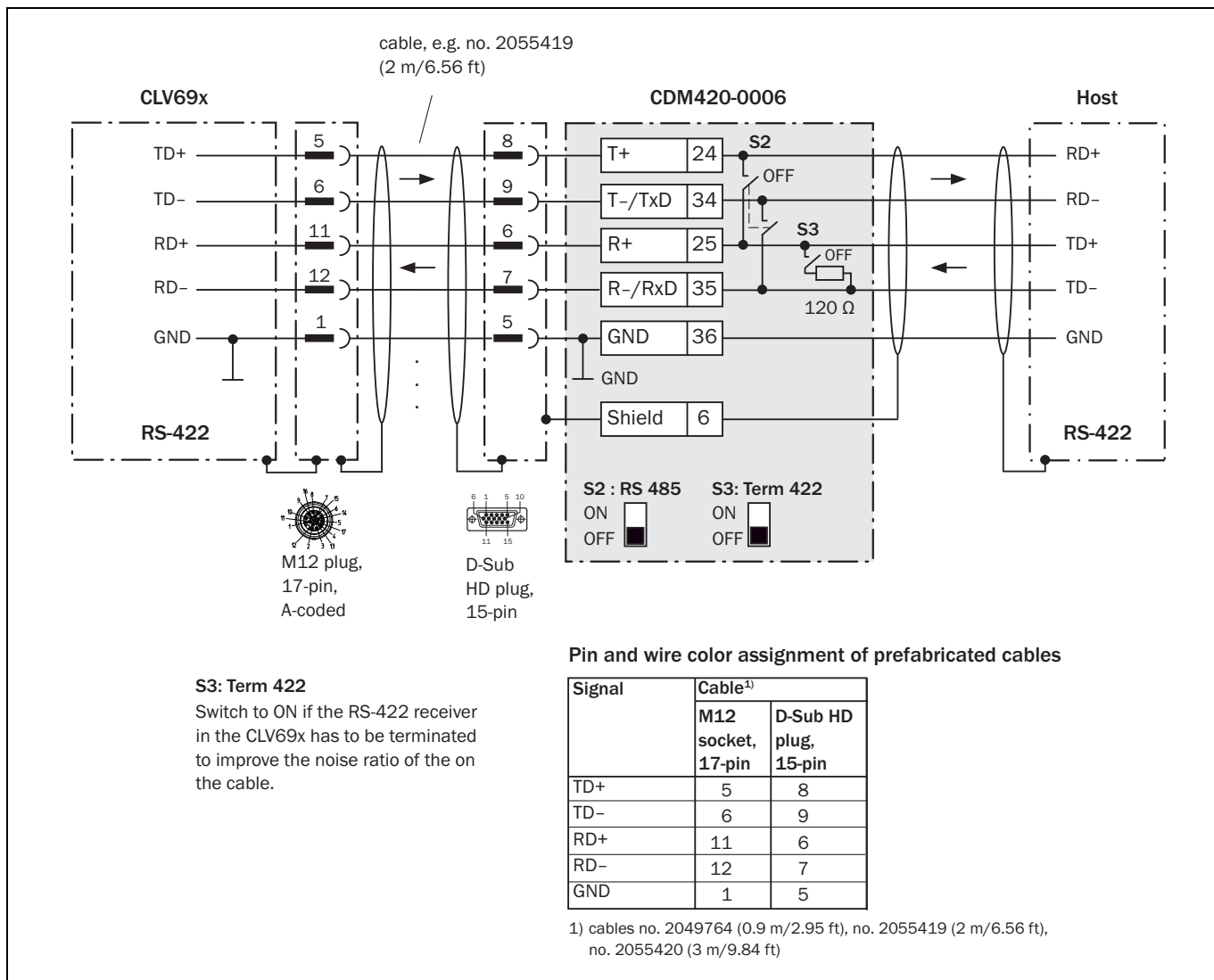
CDM420-0006 and CLV69x disconnected from power supply voltage.
Recommended position during all electrical installation work.

3.7.3 Wiring the RS-232 serial host data interface in the CDM420-0006 connection module

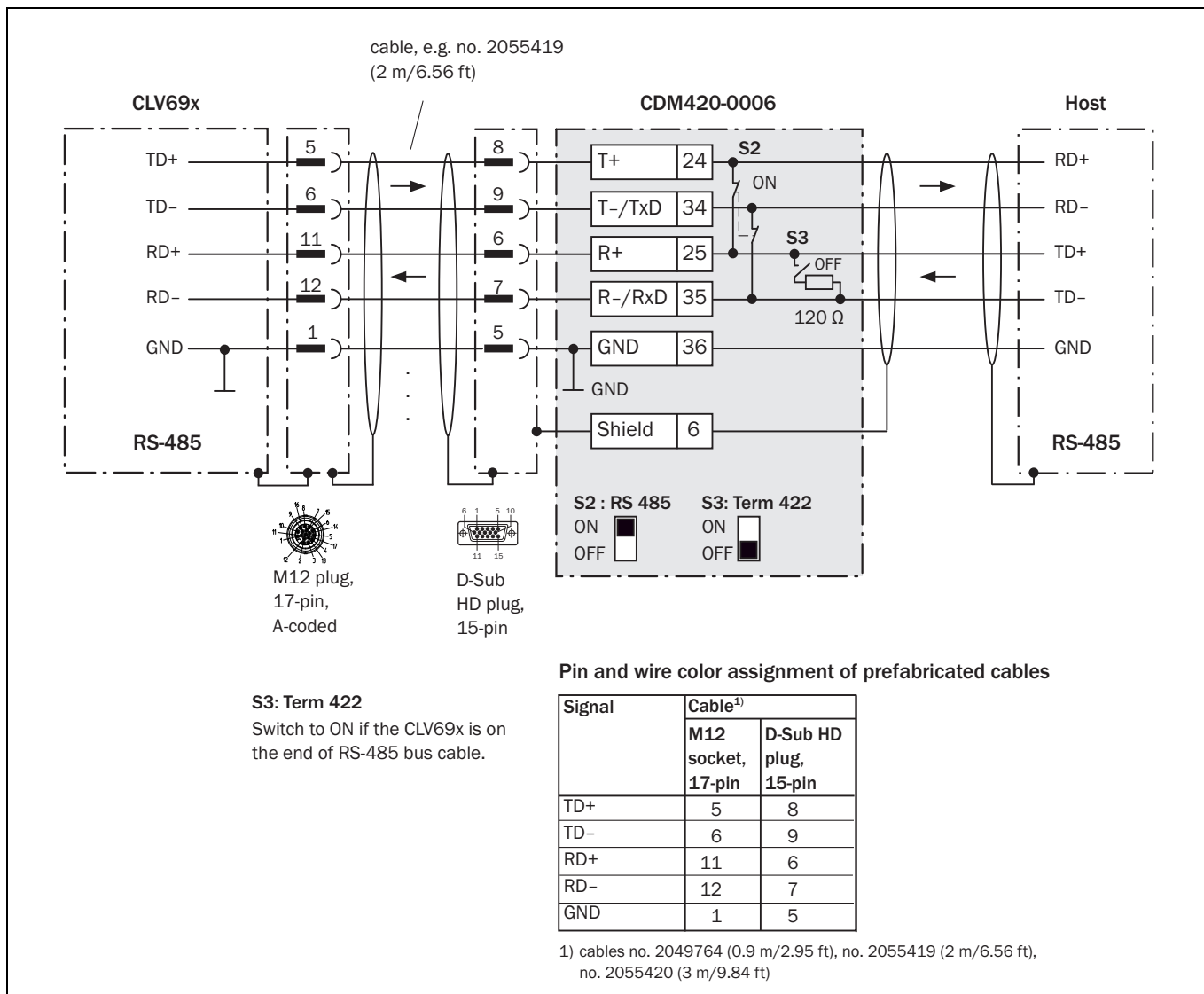


CLV69x

3.7.4 Wiring the RS-422 serial host data interface in the CDM420-0006 connection module

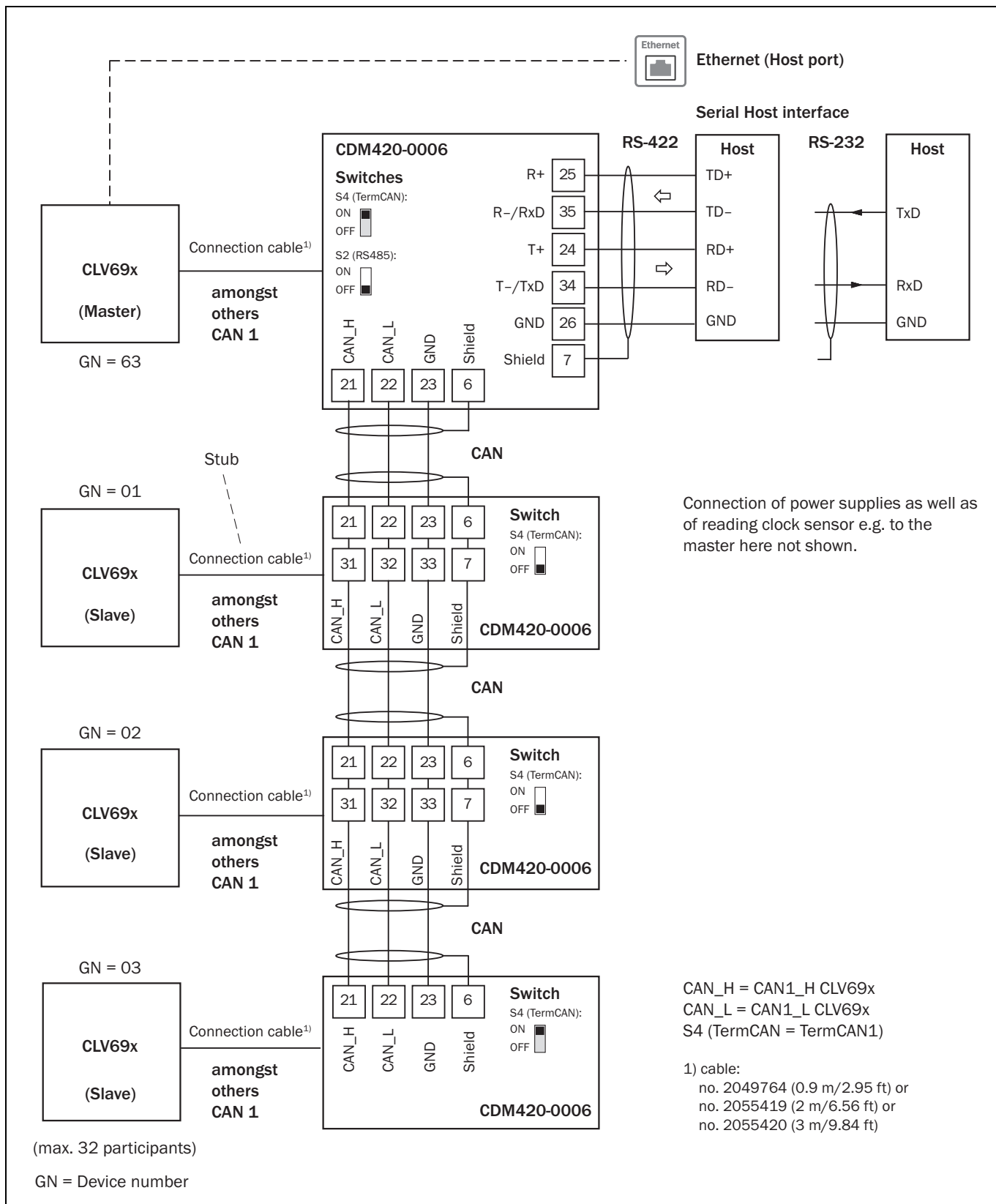


3.7.5 Wiring the RS-485 serial host data interface in the CDM420-0006 connection module

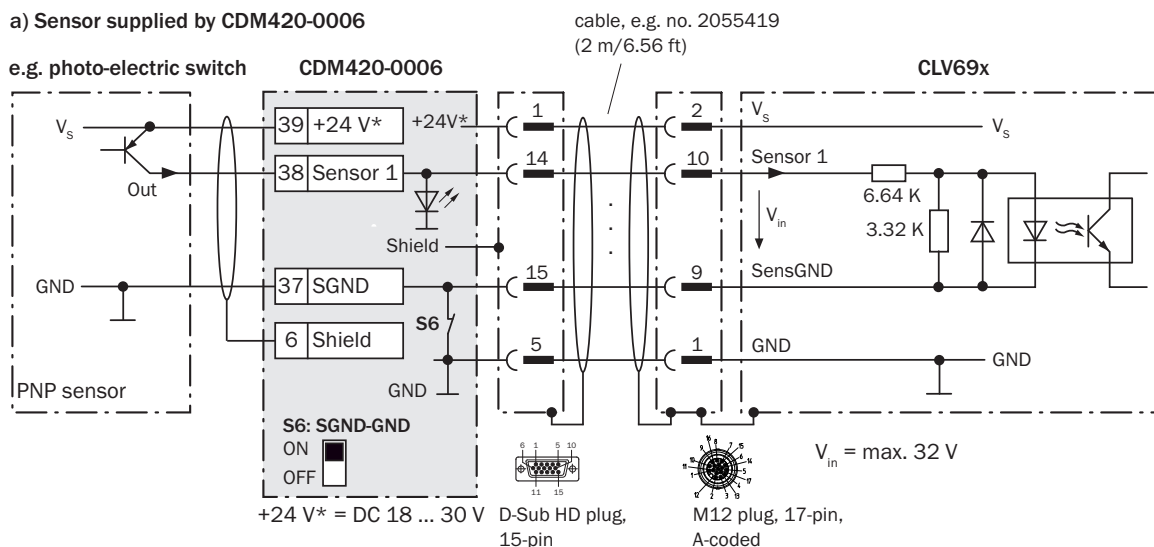


CLV69x

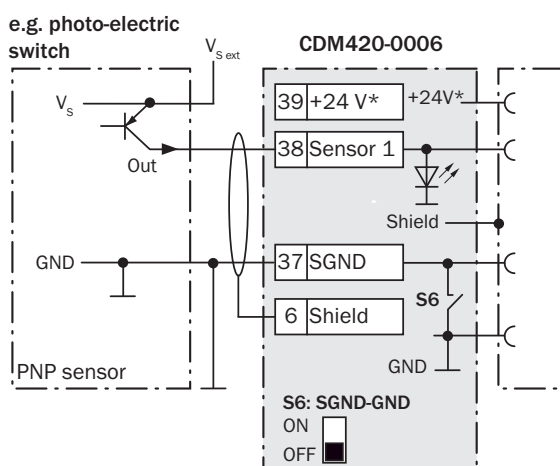
3.7.6 Wiring the CAN interface in the CDM420-0006 connection module



3.7.7 Wiring the "Sensor 1" switching input in the CDM420-0006 connection module



b) Sensor connected electrically isolated/externally supplied



Pin and wire color assignment of prefabricated cables

Signal	Cable ¹⁾	
	M12 socket, 17-pin	D-Sub HD plug, 15-pin
V_s	2	1
Sensor 1	10	14
SensGND	9	15
GND	1	5

1) cables no. 2049764 (0.9 m/2.95 ft), no. 2055419 (2 m/6.56 ft), no. 2055420 (3 m/9.84 ft)

Ratings for "Sensor 1" switching input

Switching behavior	Power fed to the input starts the assigned function, e.g. start of reading clock. CLV69x default setting: logic (active high), debouncing 10 mm
Features	- Optodecoupled, reverse polarity protected - Can be wired with the PNP output of a sensor
Electrical values	Low: $V_{in} \leq 2 V$; $I_{in} \leq 0.3 mA$ High: $6 V \leq V_{in} \leq 32 V$; $0.7 mA \leq I_{in} \leq 5 mA$

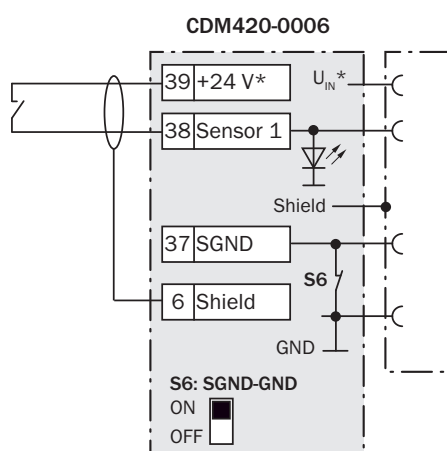
Function assignment to "Sensor 1" switching input via SOPAS:

- Start of reading clock
- Stop of reading clock
- Switching focus point
- Start of teach-in matchcode/start code comparison
- Increment input
- If required further functions in the future

Switch S6: SGND-GND

ON: GND of the sensor connected to GND of CDM420-0006/CLV69x.
OFF: Sensor connected electrically isolated to the CDM420-0006/CLV69x.
Reference potential valid for all switching inputs ("Sensor 1/2")

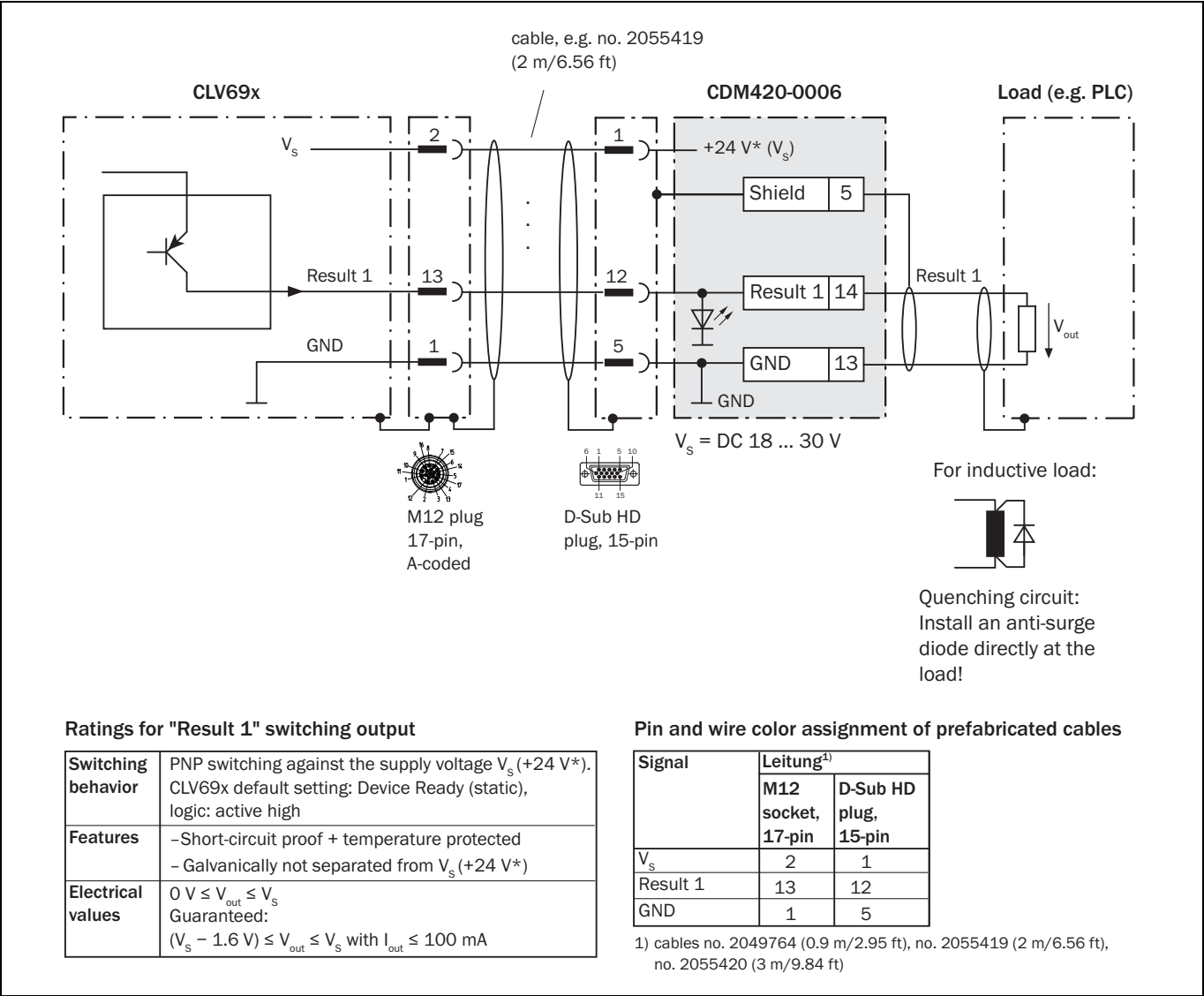
c) Switch supplied by CDM420-0006



d) Switch connected electrically isolated/externally supplied

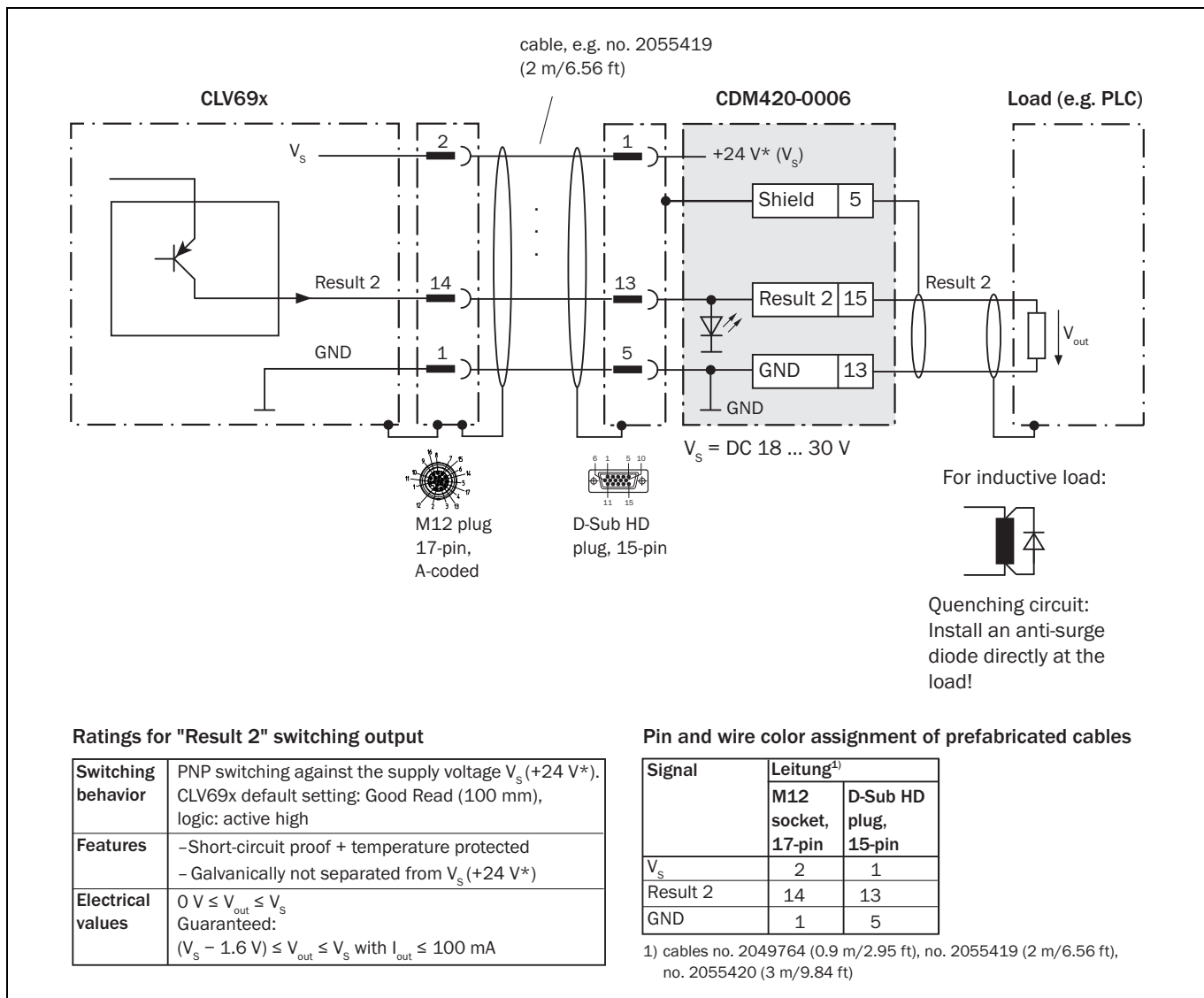
Connect the switch as shown in b)

3.7.9 Wiring the "Result 1" switching output in the CDM420-0006 connection module



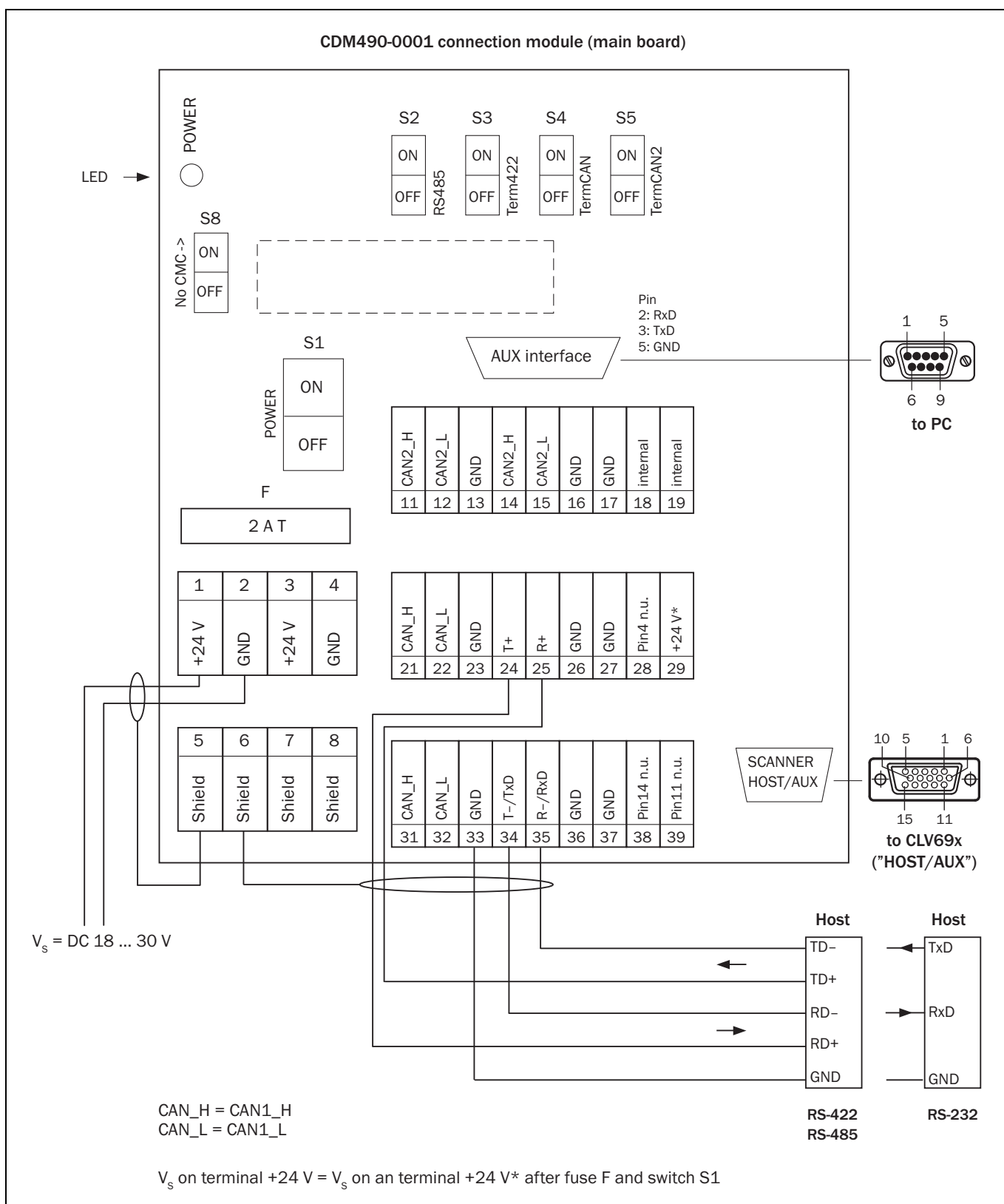
CLV69x

3.7.10 Wiring the "Result 2" switching output in the CDM420-0006 connection module



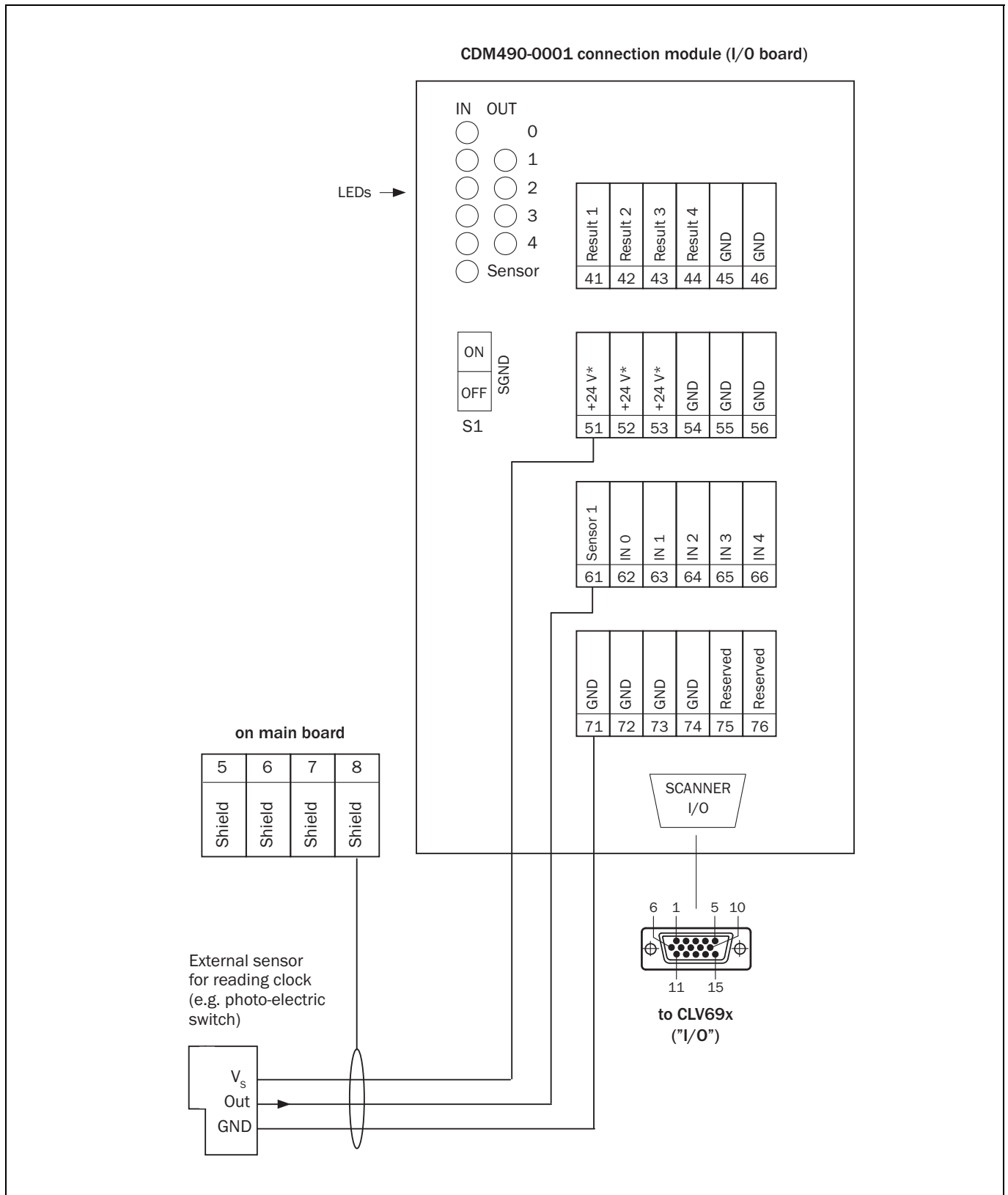
3.8 Using the CDM490-0001 connection module

3.8.1 Wiring overview, part 1 (main board left-hand side on bottom)

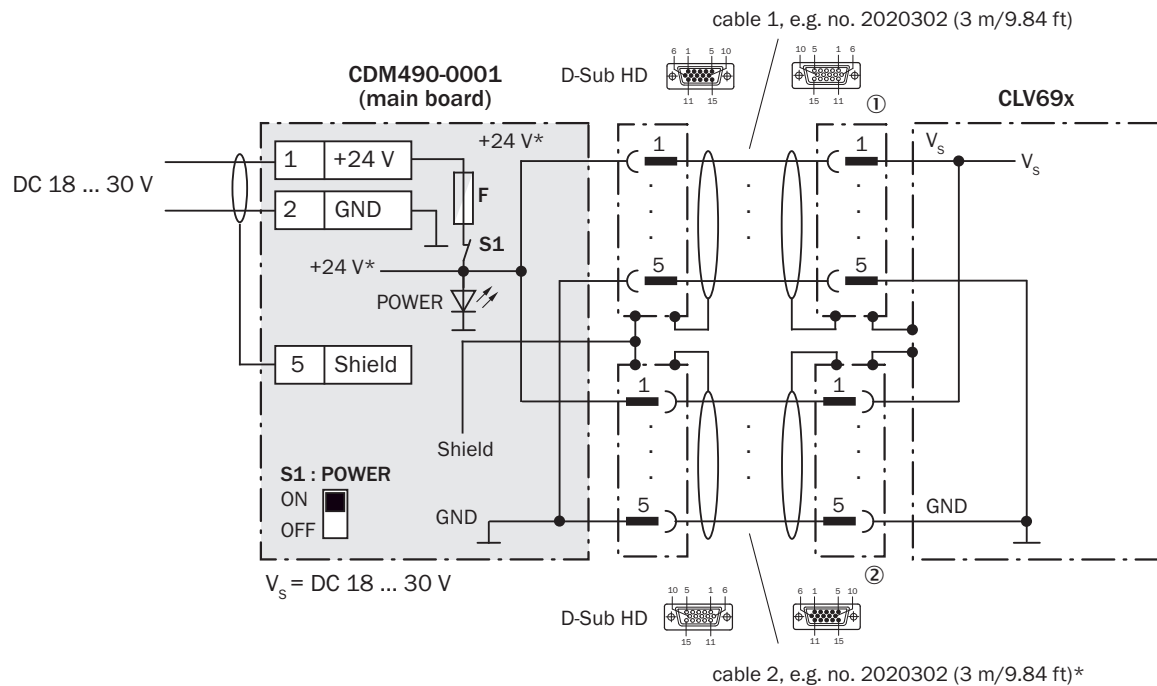


CLV69x

3.8.2 Wiring overview, part 2 (I/O board right-hand side on top), one switching input used



3.8.3 Wiring the supply voltage in the CDM490-0001 connection module



* if no switching inputs/outputs of the CLV69x are used, cable 2 is not required

① “HOST/AUX” connection

② "I/O" connection

V_s on terminal +24 V = V_s on terminal +24 V* after fuse F and switch S1

Switch S1:

ON:

Power supply voltage V_s (+24 V) switched to V_s (+24 V*) via fuse to CDM490-0001 and CLV69x.

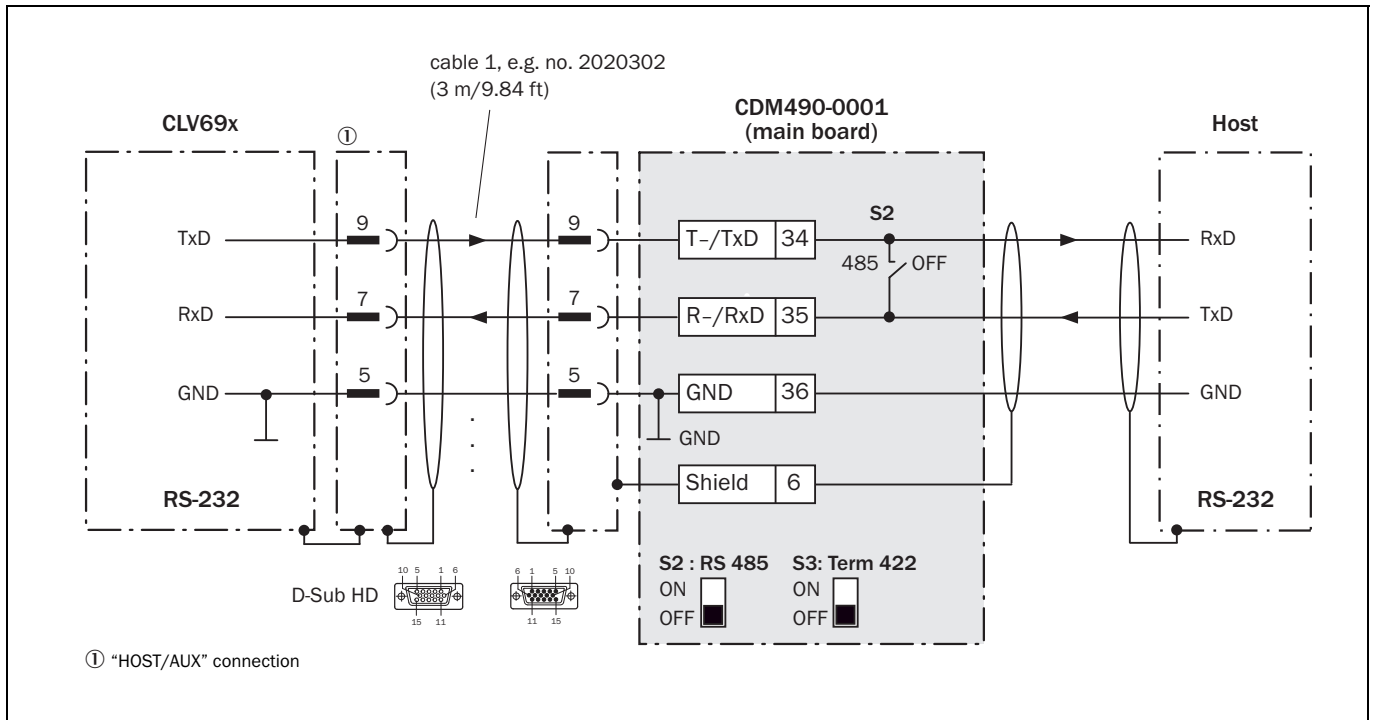
V_s (+24 V*) additionally available on terminal 29 as well as on terminals 51 ... 53 on the I/O board.

OFF:

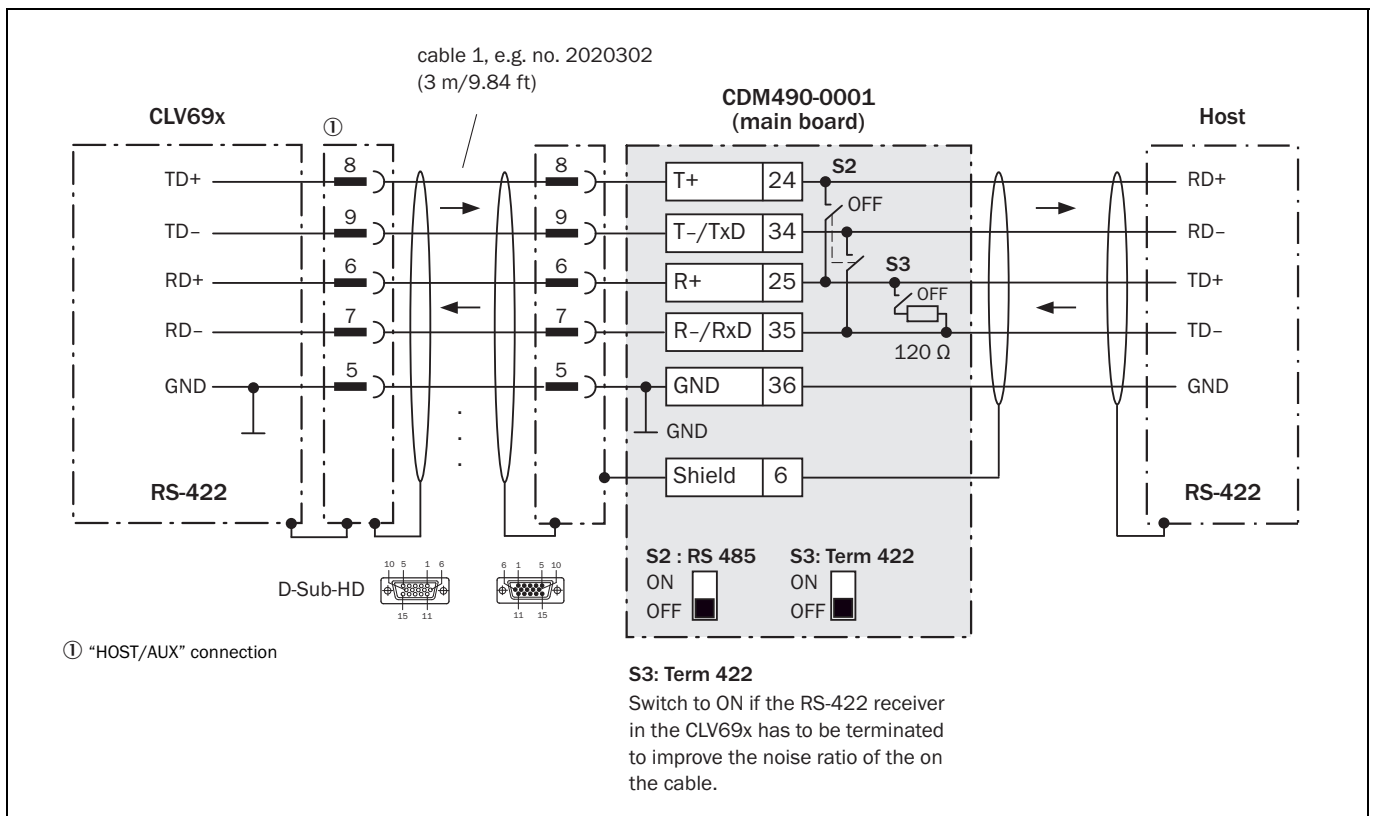
CDM490-0001 and CLV69x disconnected from power supply voltage.
Recommended position during all electrical installation work.

CLV69x

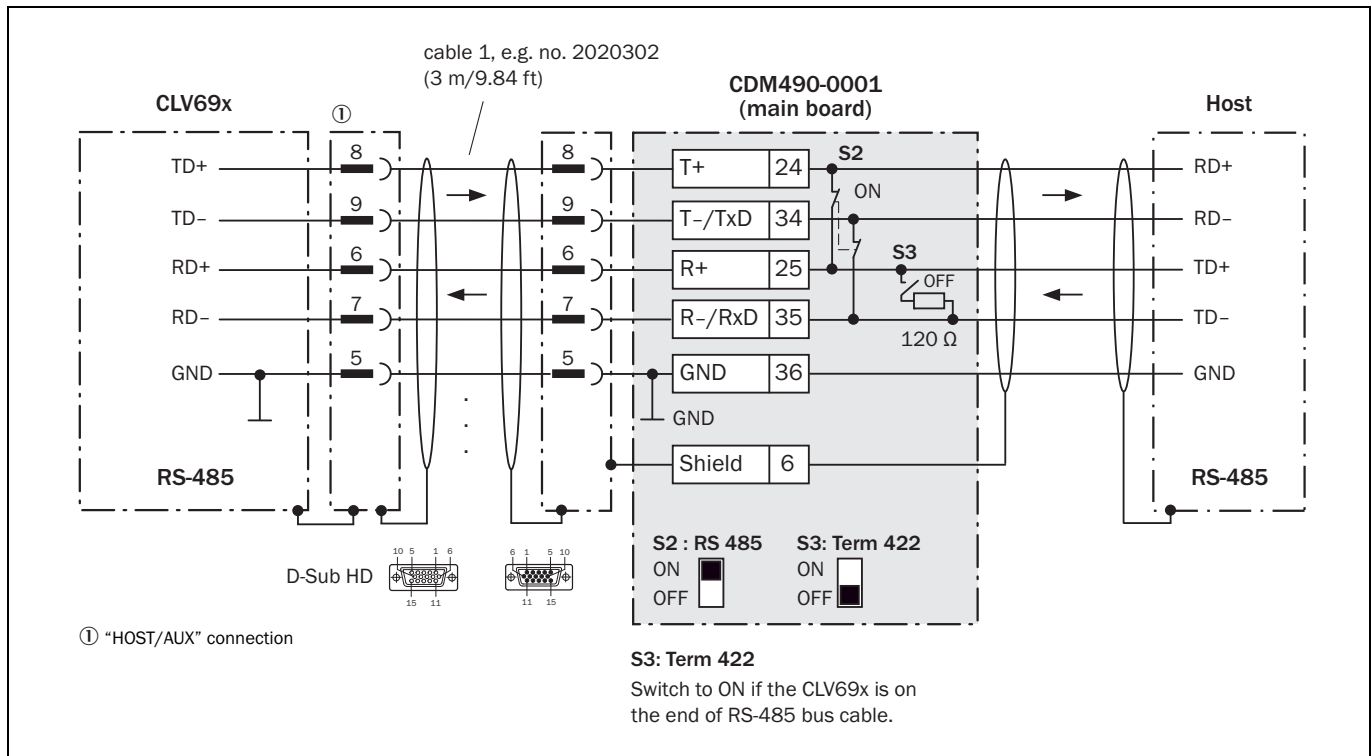
3.8.4 Wiring the RS-232 serial host data interface in the CDM490-0001 connection module



3.8.5 Wiring the RS-422 serial host data interface in the CDM490-0001 connection module

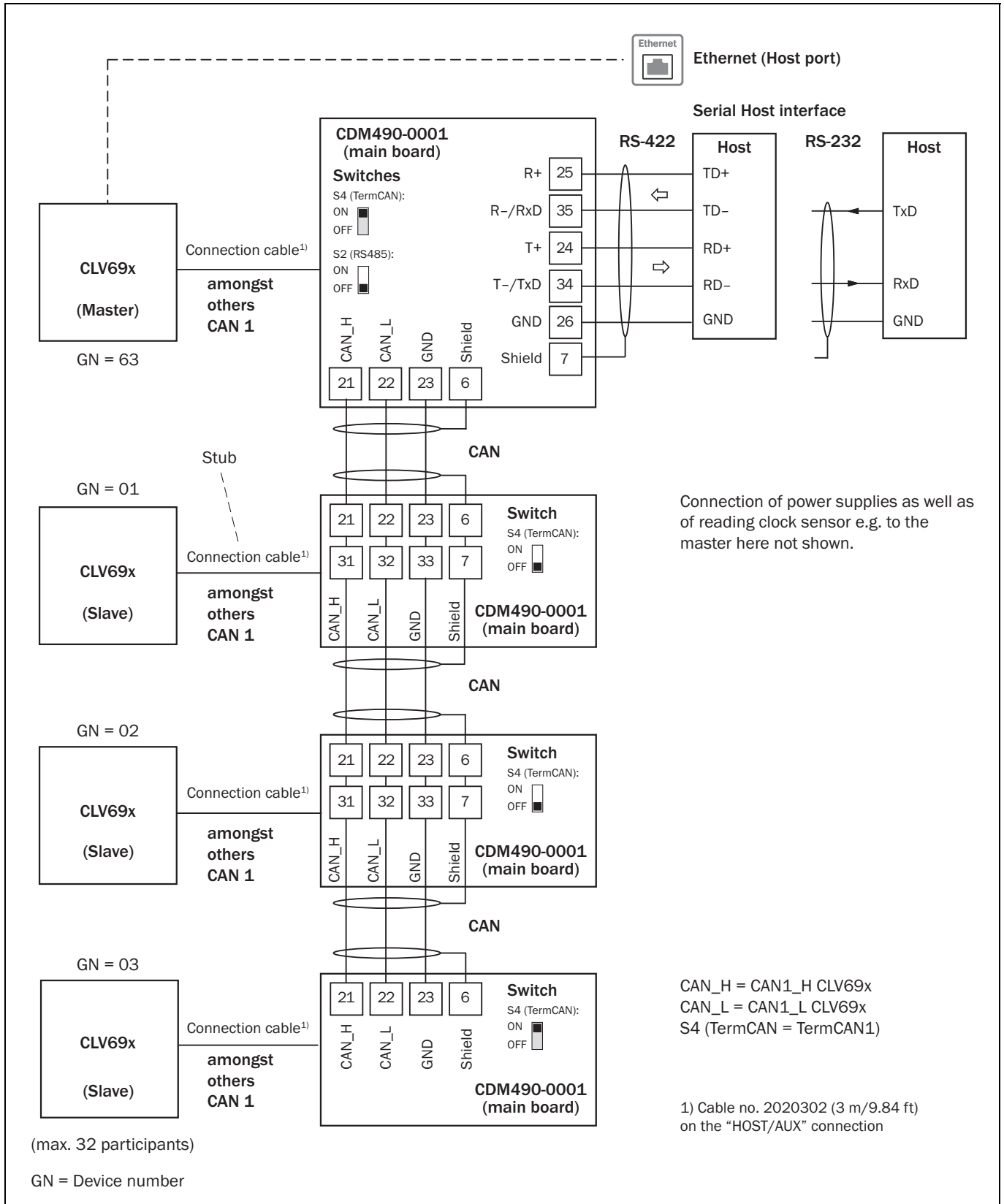


3.8.6 Wiring the RS-485 serial host data interface in the CDM490-0001 connection module



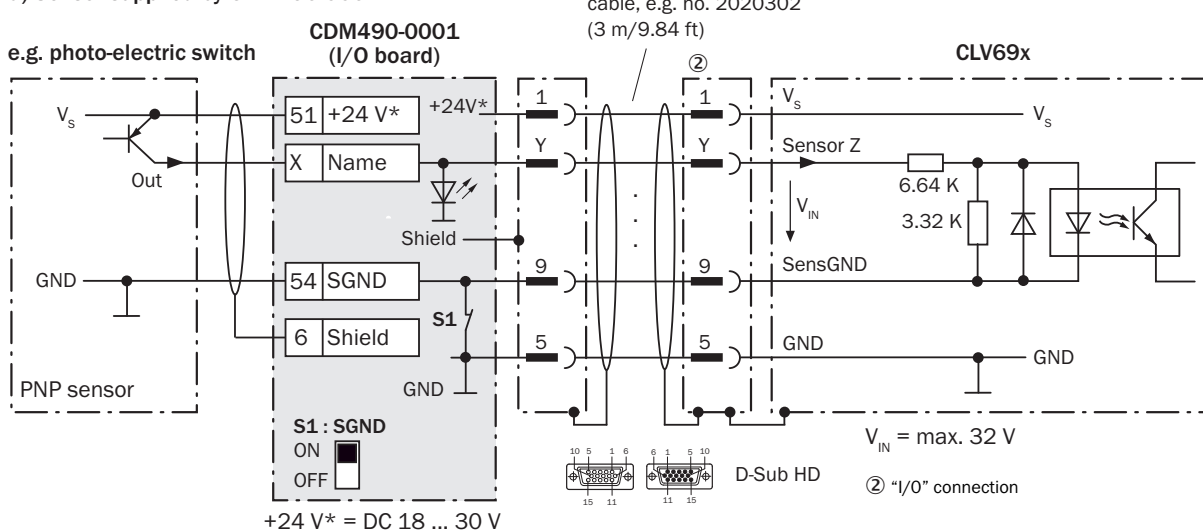
CLV69x

3.8.7 Wiring the CAN interface in the CDM490-0001 connection module



3.8.8 Wiring the "Sensor 1 ... 6" switching inputs in the CDM490-0001 connection module

a) Sensor supplied by CDM490-0001



CDM490-0001			CLV69x	
Terminal X	Name	Pin Y	Pin Y	Sensor Z
61	Sensor	3	3	Sensor 1
62	IN 0	6	6	Sensor 2
63	IN 1	2	2	Sensor 3
64	IN 2	7	7	Sensor 4
65	IN 3	11	11	Sensor 5
66	IN 4	12	12	Sensor 6

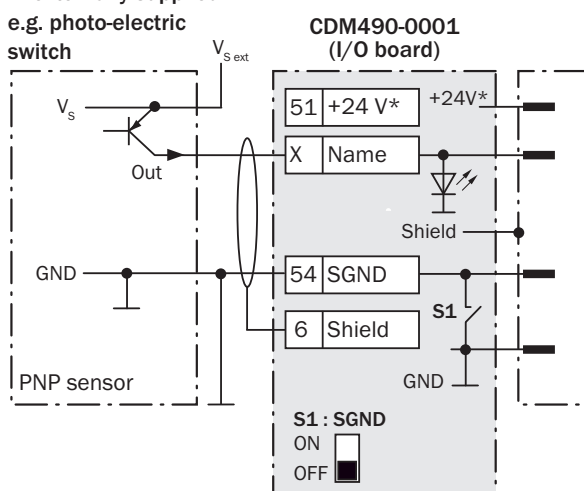
Switch S1: SGND

ON: GND of the sensor connected to GND of CDM490-0001/CLV69x.

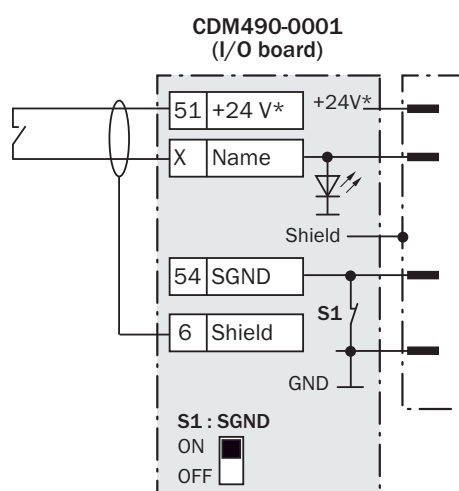
OFF: Sensor connected electrically isolated to the CDM490-0001/CLV69x.

Reference potential valid for all switching inputs ("Sensor 1 ... 6")

b) Scheme: Sensor connected electrically isolated/externally supplied



c) Scheme: Switch supplied by CDM490-0001



d) Scheme: Switch connected electrically isolated/externally supplied

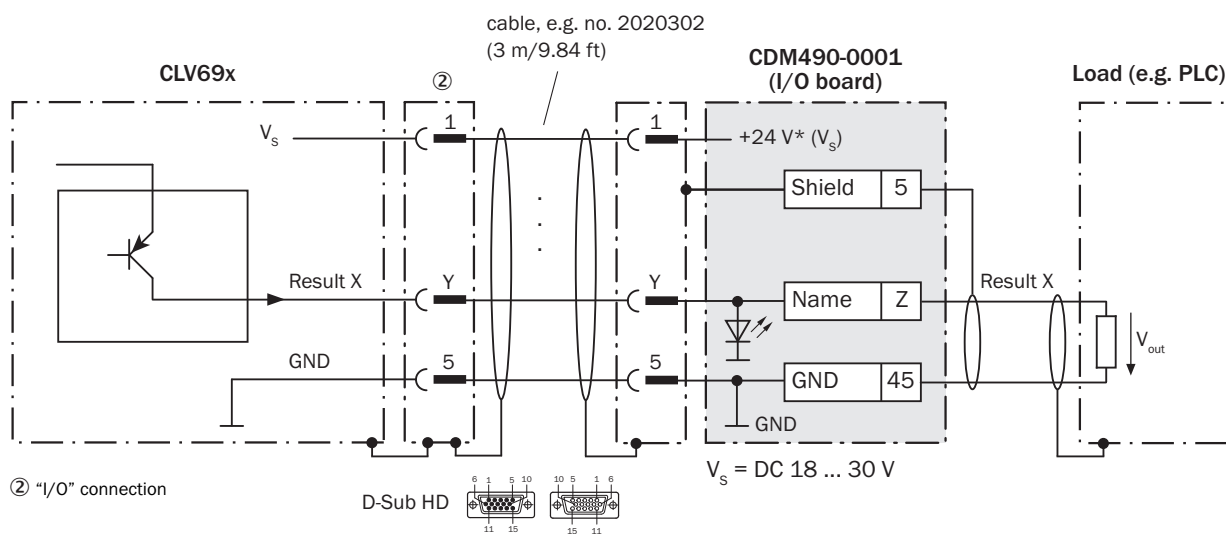
Connect the switch as shown in b)

Ratings for "Sensor 1 ... 6" switching inputs

Switching behavior	Power fed to the input starts the assigned function, e.g. start of reading clock. CLV69x default setting: logic (active high), debouncing 10 ms
Features	- Optodecoupled, reverse polarity protected - Can be wired with the PNP output of a sensor
Electrical values	Low: $V_{in} \leq 2 V$; $I_{in} \leq 0.3 mA$ High: $6 V \leq V_{in} \leq 32 V$; $0.7 mA \leq I_{in} \leq 5 mA$

CLV69x

3.8.9 Wiring the "Result 1 ... 4" switching outputs in the CDM490-0001 connection module



CLV69x	Pin Y	Pin Y	Name	Terminal Z	Result X
Result 1	4	4	Result 1	41	Result 1
Result 2	8	8	Result 2	42	Result 2
Result 3	10	10	Result 3	43	Result 3
Result 4	15	15	Result 4	44	Result 4

For inductive load:



Quenching circuit:
Install an anti-surge
diode directly at the
load!

Ratings for "Result 1 ... 4" switching outputs

Switching behavior	PNP switching against the supply voltage V _s (+24 V*). CLV69x default setting: Result 1: Device Ready (static), logic: active high Result 2: Good Read, 100 mm, logic: active high Result 3: no function assigned Result 4: no function assigned
Features	– Short-circuit proof + temperature protected – Galvanically not separated from V _s (+24 V*)
Electrical values	0 V ≤ V _{out} ≤ V _s Guaranteed: (V _s – 1.6 V) ≤ V _{out} ≤ V _s with I _{out} ≤ 100 mA

4 Reading field diagrams

4.1 Reading conditions for all diagrams

Test code	Code 128
Print contrast	>90 %
Tilt	$\pm 45^\circ$
Ambient light	<2.000 lx
Good Read rate	>75 %

Important The minimum and maximum reading distances are measured radially by the CLV69x!
Using the following reading field diagrams required observation of the resolution-dependent max. scanning frequency in the corresponding diagrams for each resolution version (Standard Density, High Density and Low Density).

CLV69x

4.2 Overview of reading field diagrams

Scanning method: Line scanner

CLV69x-Type	Resolution	Diagram	Page
CLV690-00x0	Standard Density	Reading field height/resolution as a function of reading distance	50
CLV690-00x0	Standard Density	Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 40°	51
CLV690-00x0	Standard Density	Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 56°	52
CLV690-00x0	Standard Density	Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 40°	53
CLV690-00x0	Standard Density	Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 56°	54
CLV690-00x0	Standard Density	Characteristics field scanning frequency	55
CLV691-00x0	Low Density	Reading field height/Tilt as a function of reading distance for resolution 0.50 mm	62
CLV691-00x0	Low Density	Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 40°	63
CLV691-00x0	Low Density	Min. and max. reading distance (DOF) for resolution 0.50 mm/aperture angle 60°	64
CLV691-00x0	Low Density	Characteristics field scanning frequency	65
CLV692-00x0	High Density	Reading field height/resolution as a function of reading distance	68
CLV692-00x0	High Density	Min. and max. reading distance (DOF) for resolution 0.25 mm/aperture angle 40°	69
CLV692-00x0	High Density	Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 40°	70
CLV692-00x0	High Density	Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 56°	71
CLV692-00x0	High Density	Characteristics field scanning frequency	72

Scanning method: Line scanner with oscillating mirror

CLV69x-Type	Resolution	Diagram	Page
CLV690-10x0	Standard Density	Reading field height/resolution as a function of reading distance	56
CLV690-10x0	Standard Density	Min. and max. reading distance (DOF) for 0.35 mm/aperture angle 40°	57
CLV690-10x0	Standard Density	Min. and max. reading distance (DOF) for 0.35 mm/aperture angle 50°	58
CLV690-10x0	Standard Density	Min. and max. reading distance (DOF) for 0.50 mm/aperture angle 40°	59
CLV690-10x0	Standard Density	Min. and max. reading distance (DOF) for 0.50 mm/aperture angle 50°	60
CLV690-10x0	Standard Density	Characteristics field scanning frequency	61
CLV690-10x0	Standard Density	Deflection range	61
CLV690-10x0	Low Density	Reading field height/Tilt as a function of reading distance for resolution 0.50 mm	66
CLV690-10x0	Low Density	Min. and max. reading distance (DOF) for 0.50 mm/aperture angle 40°	63
CLV690-10x0	Low Density	Min. and max. reading distance (DOF) for 0.50 mm/aperture angle 50°	64
CLV690-10x0	Low Density	Characteristics field scanning frequency	67
CLV690-10x0	Low Density	Deflection range	67
CLV692-10x0	High Density	Reading field height/resolution as a function of reading distance	73
CLV692-10x0	High Density	Min. and max. reading distance (DOF) for resolution 0.25 mm/aperture angle 40°	74
CLV692-10x0	High Density	Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 40°	75
CLV692-10x0	High Density	Min. and max. reading distance (DOF) for resolution 0.35 mm/aperture angle 50°	76
CLV692-10x0	High Density	Characteristics field scanning frequency	77
CLV692-10x0	High Density	Deflection range	77

4.2.1 Standard Density: Reading performance data of line scanner

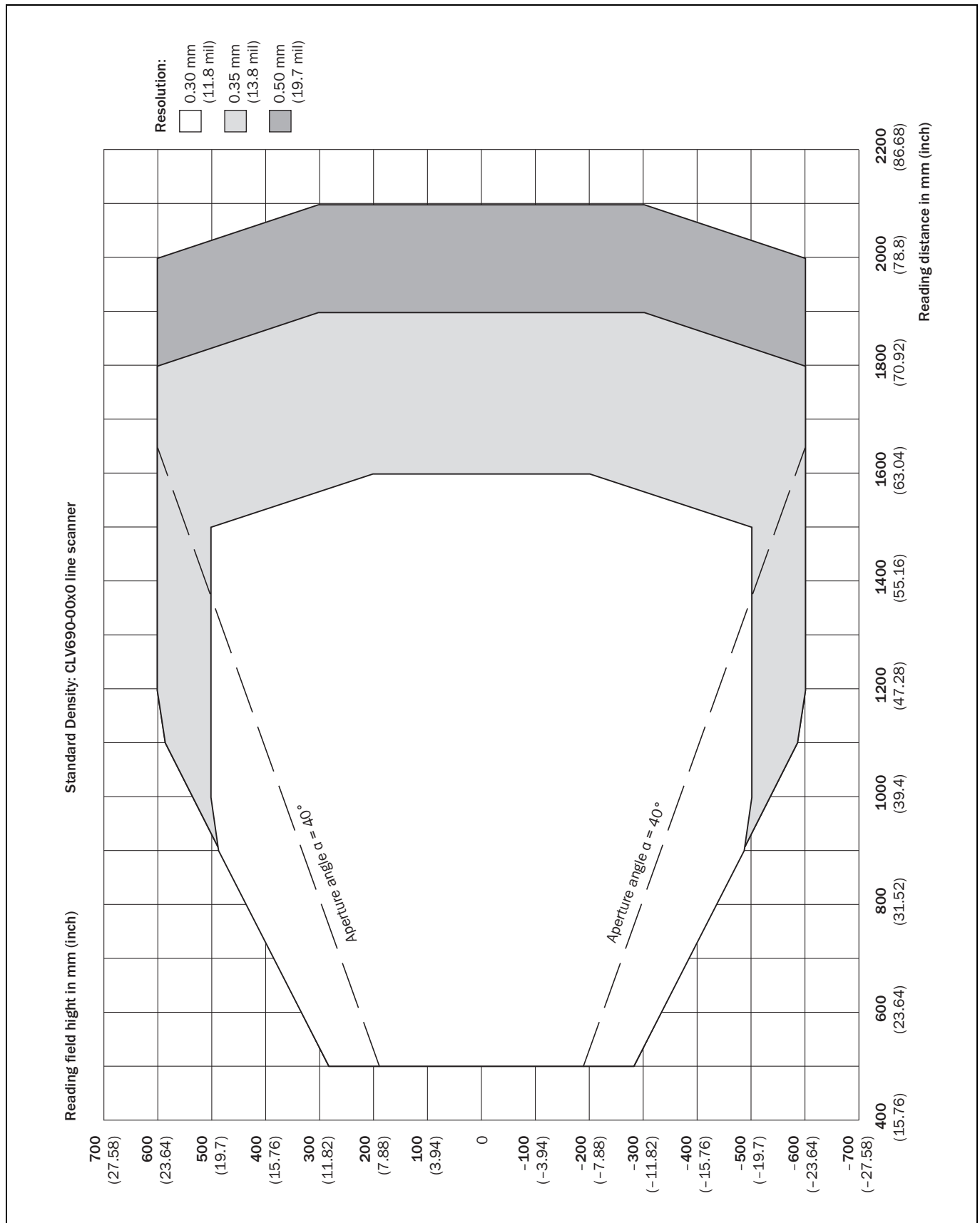


Fig. 4-1: CLV690-00x0 (Standard Density): Reading field height as a function of the reading distance and resolution

CLV69x

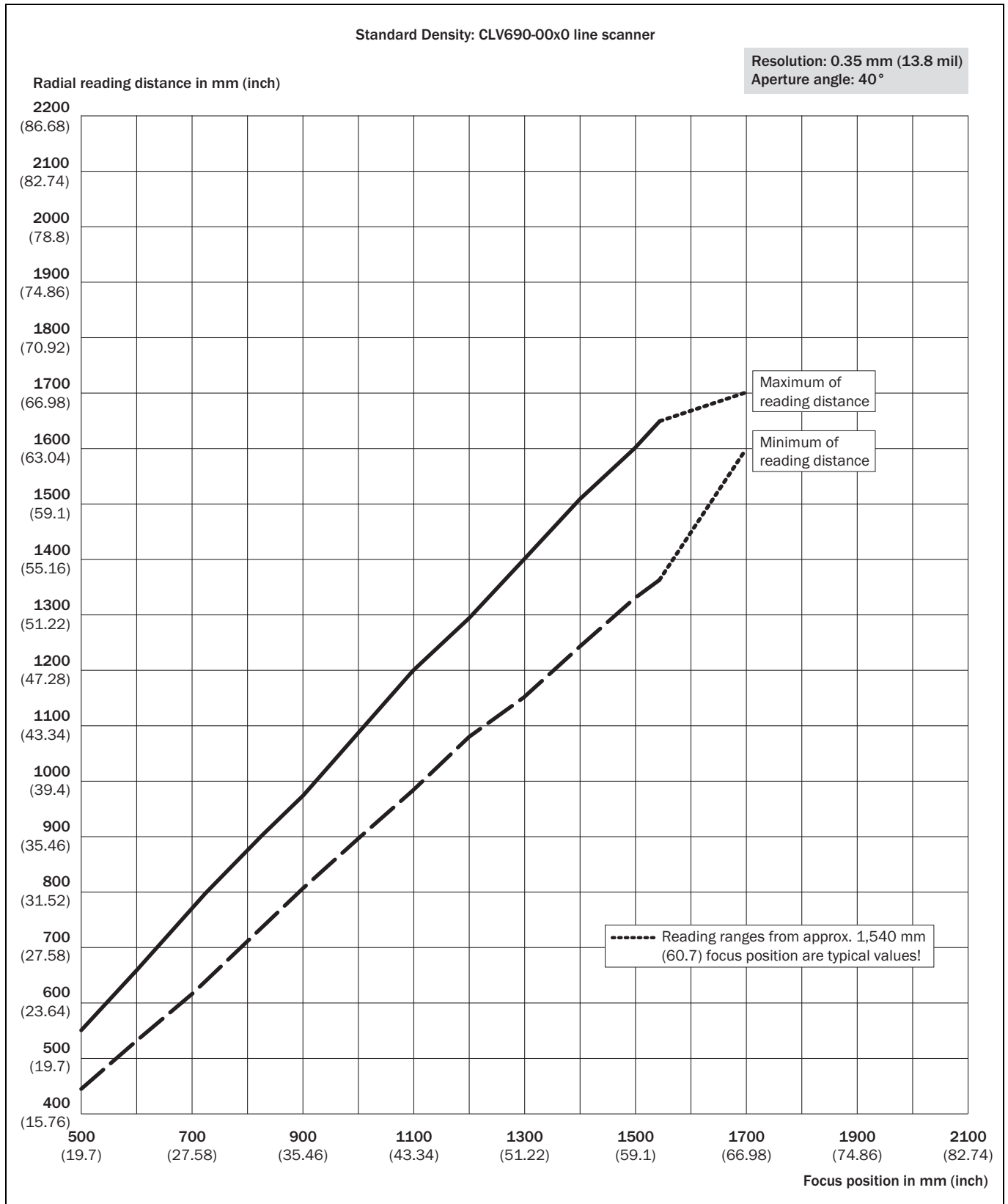


Fig. 4-2: CLV690-00x0 (Standard Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm (13.8 mil) and an aperture angle of $\alpha = 40^\circ$

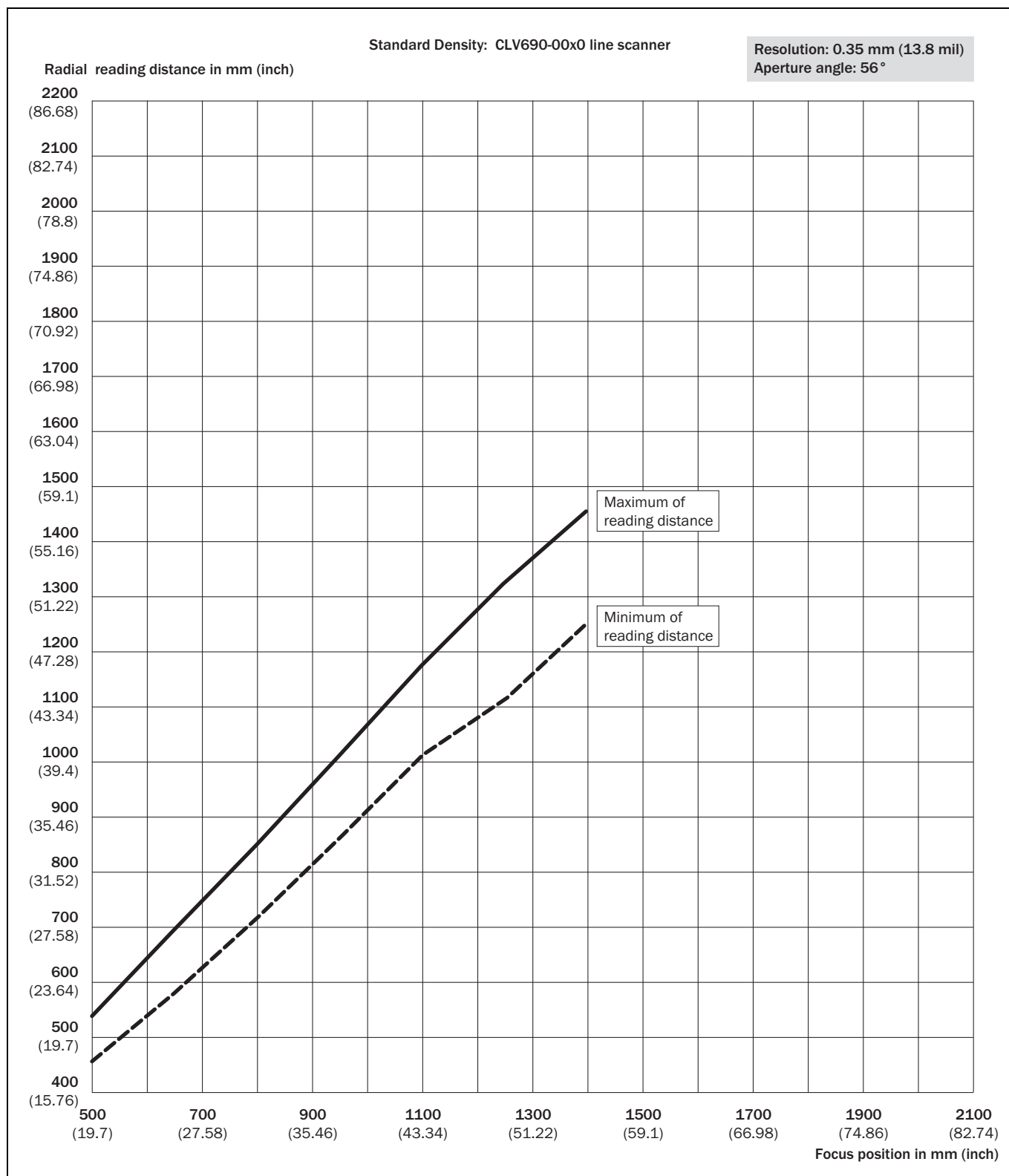


Fig. 4-3: CLV690-00x0 (Standard Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm (13.8 mil) and an aperture angle of $\alpha = 56^\circ$

CLV69x

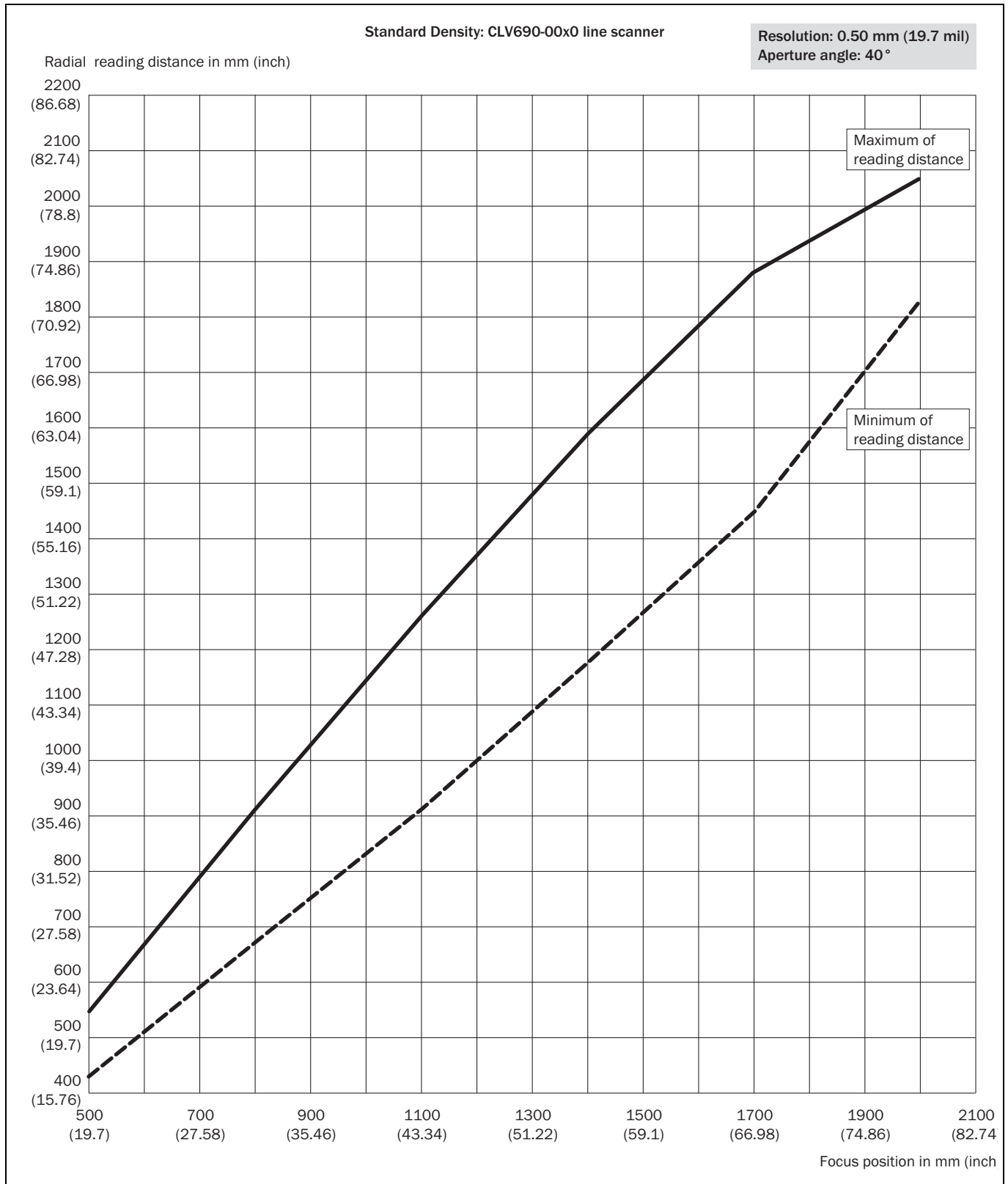


Fig. 4-4: CLV690-00x0 (Standard Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.50 mm (19.7 mil) and an aperture angle of $\alpha = 40^\circ$

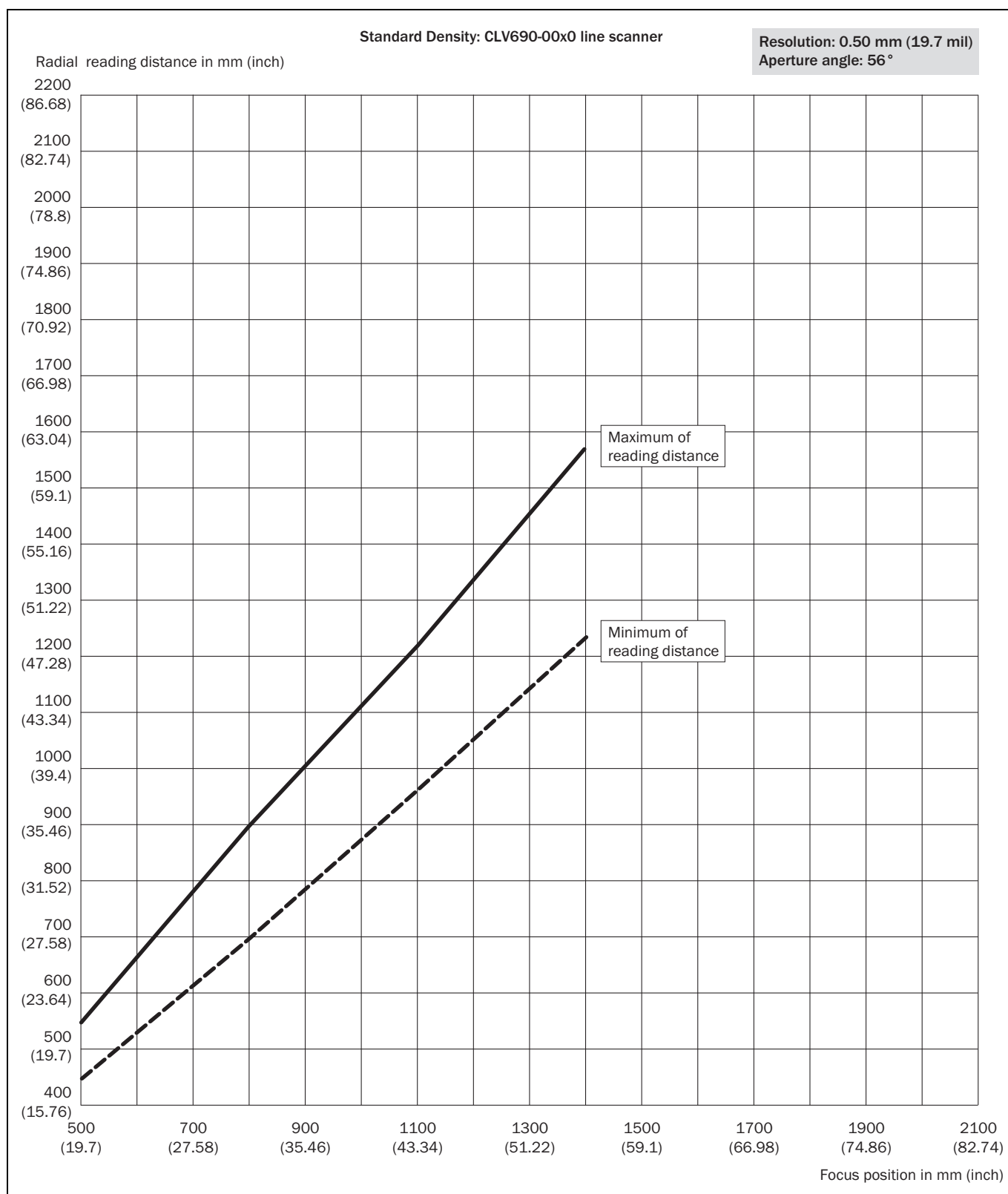


Fig. 4-5: CLV690-00x0 (Standard Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.50 mm (19.7 mil) and an aperture angle of $\alpha = 56^\circ$

CLV69x

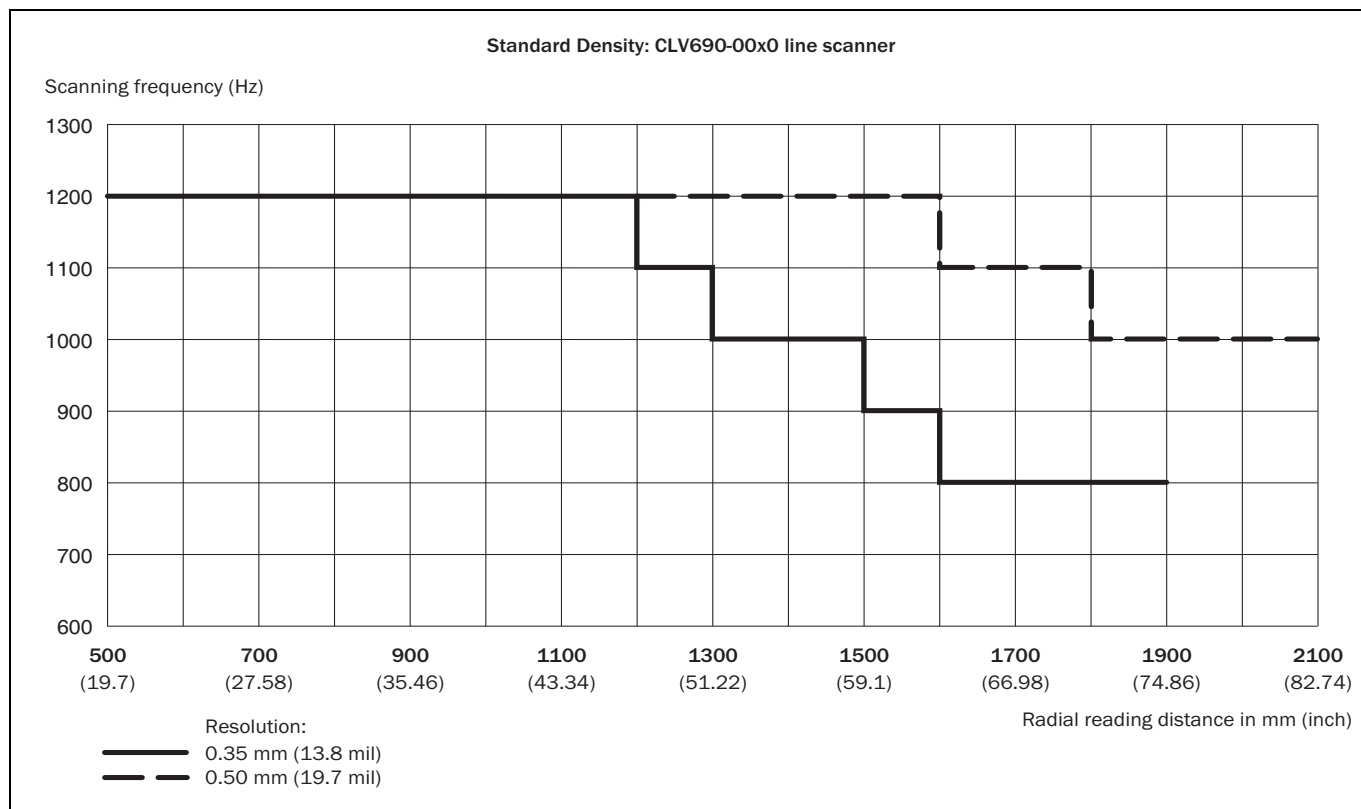


Fig. 4-6: CLV690-00x0 (Standard Density): Scanning frequency as a function of the radial reading distance and resolution

4.2.2 Standard Density: Reading performance data of line scanner with oscillating mirror

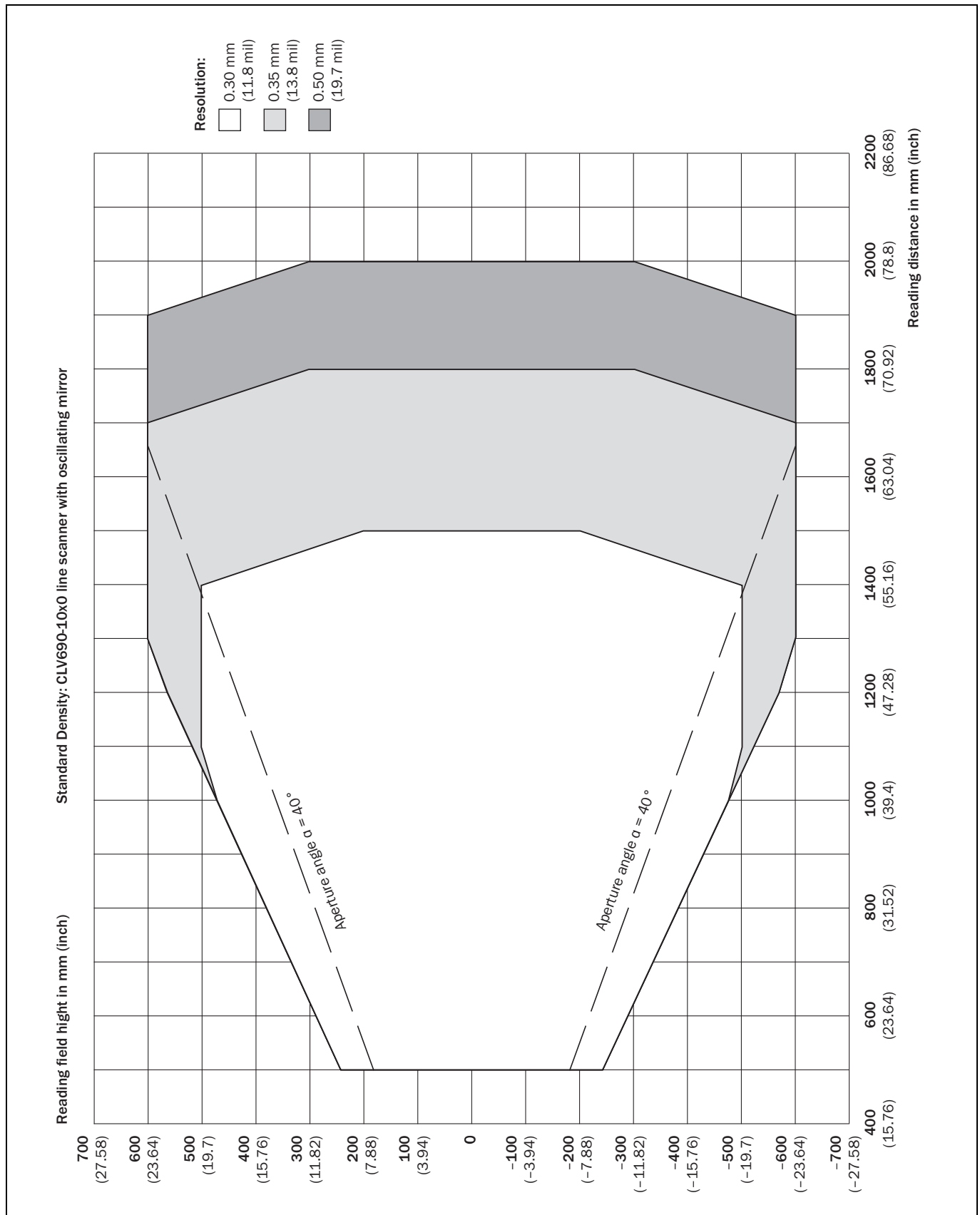


Fig. 4-7: CLV690-10x0 (Standard Density): Reading field height as a function of the reading distance and resolution

CLV69x

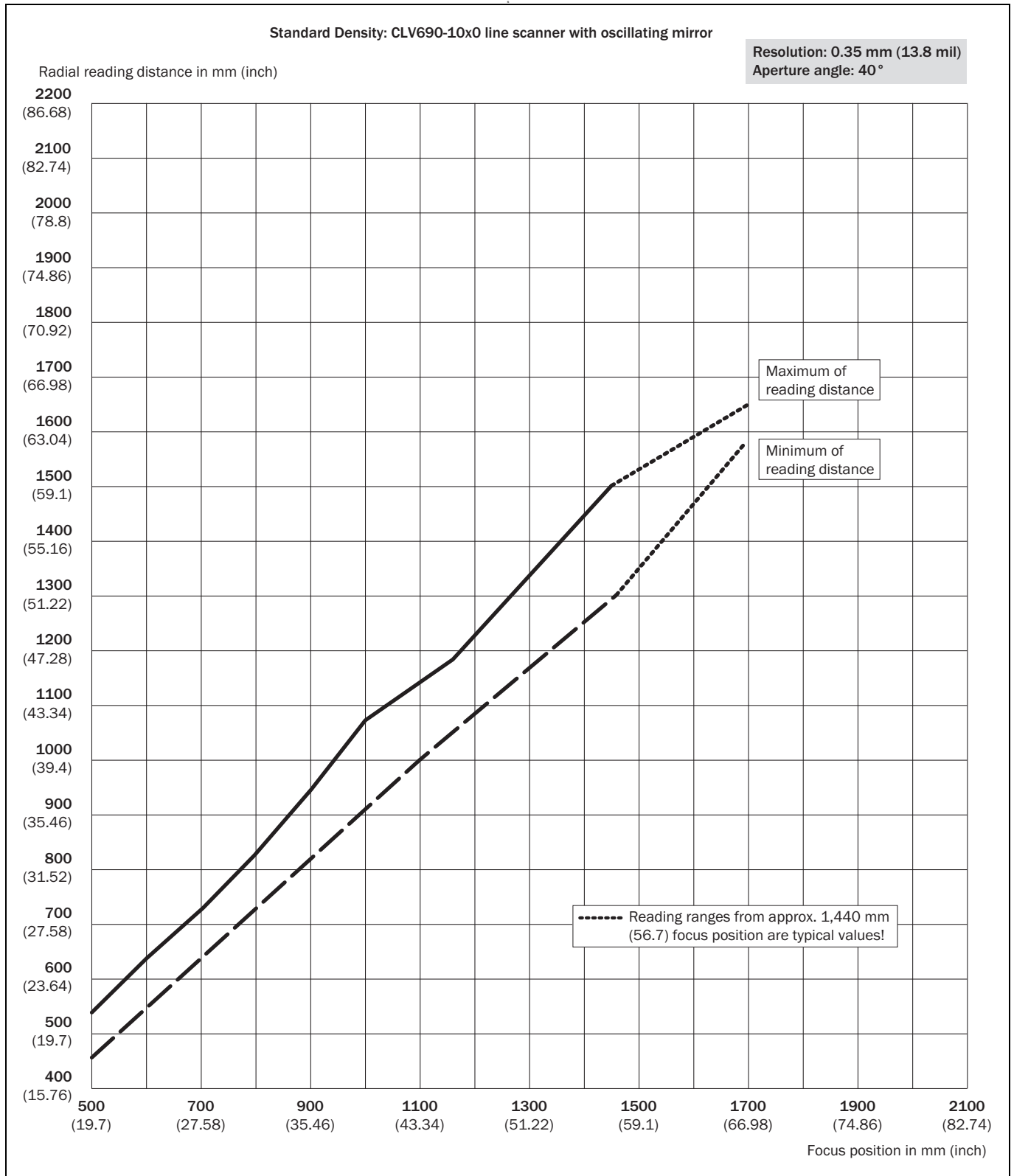


Fig. 4-8: CLV690-10x0 (Standard Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm (13.8 mil) and an aperture angle of $\alpha = 40^\circ$

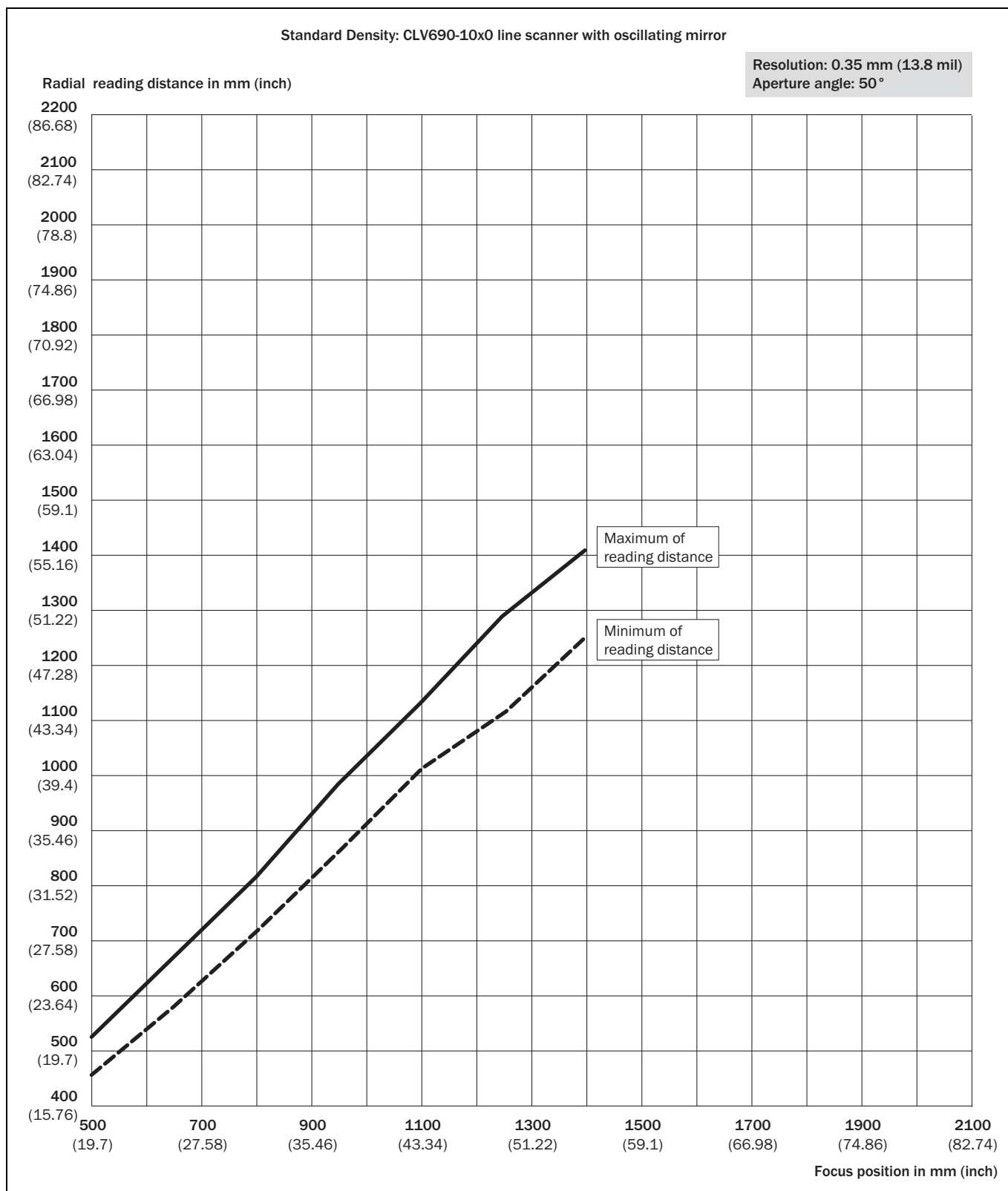


Fig. 4-9: CLV690-10x0 (Standard Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm (13.8 mil) and an aperture angle of $\alpha = 50^\circ$

CLV69x

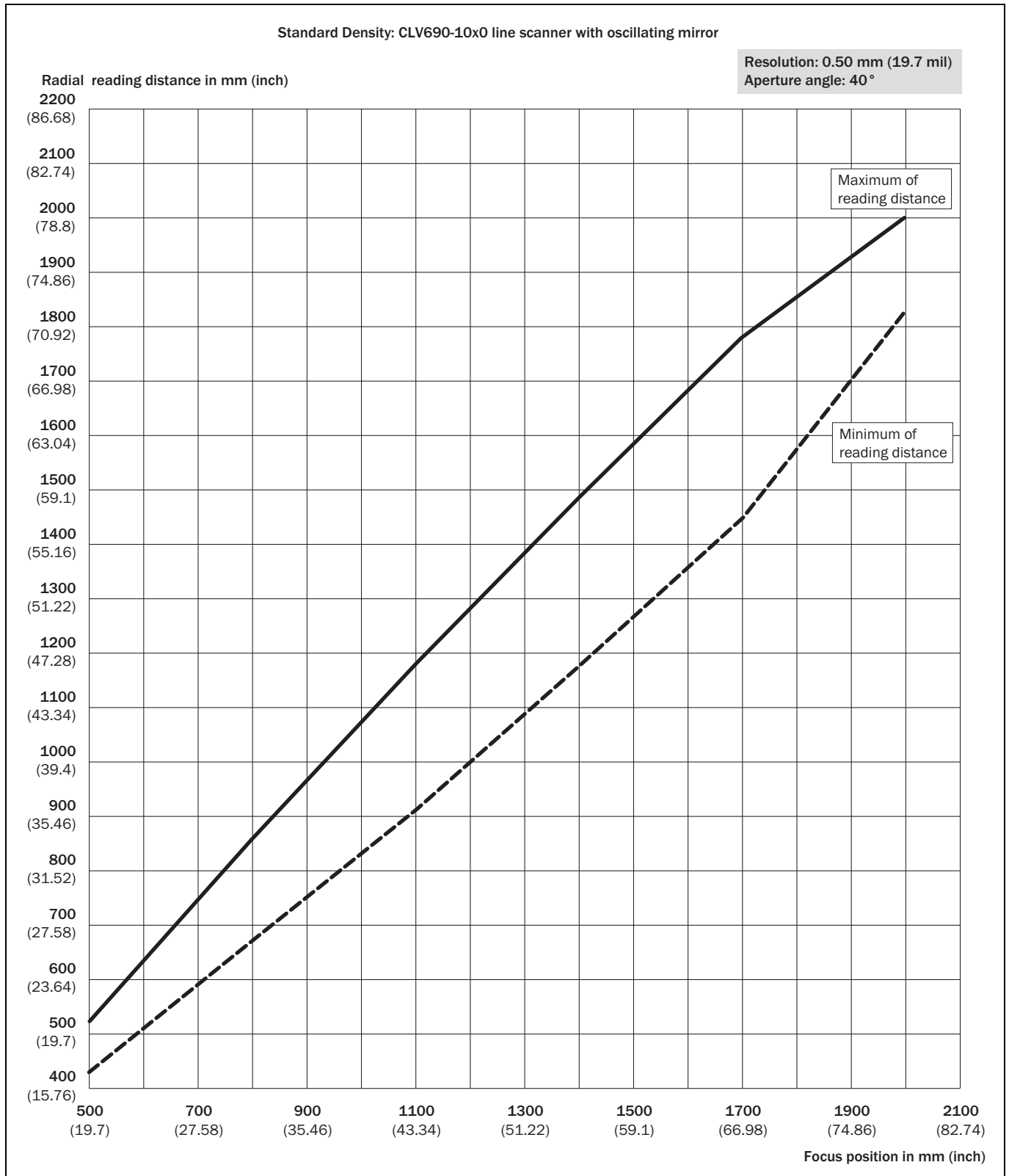


Fig. 4-10: CLV690-10x0 (Standard Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.50 mm (19.7 mil) and an aperture angle of $\alpha = 40^\circ$

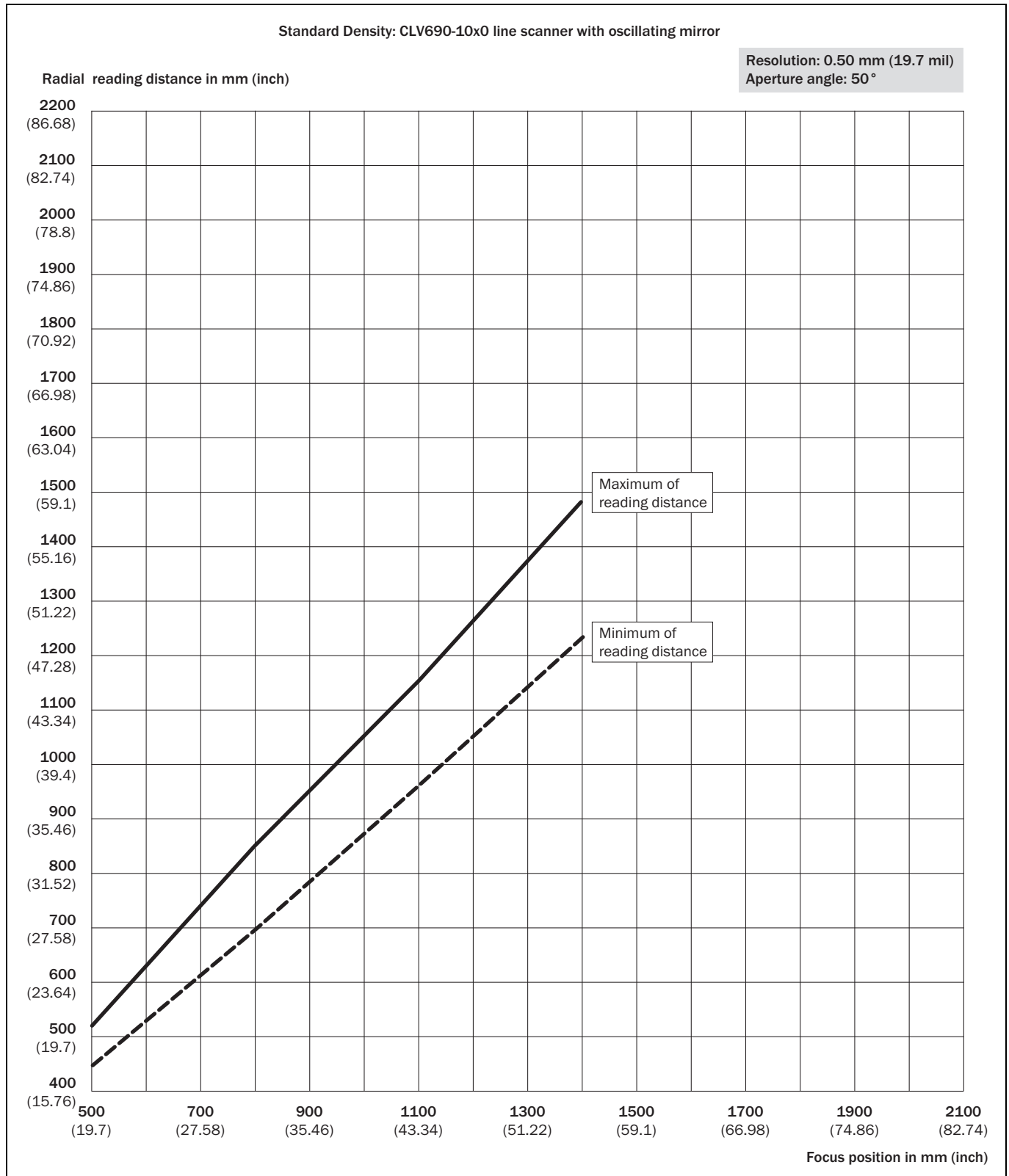


Fig. 4-11: CLV690-10x0 (Standard Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.50 mm (19.7 mil) and an aperture angle of $\alpha = 50^\circ$

CLV69x

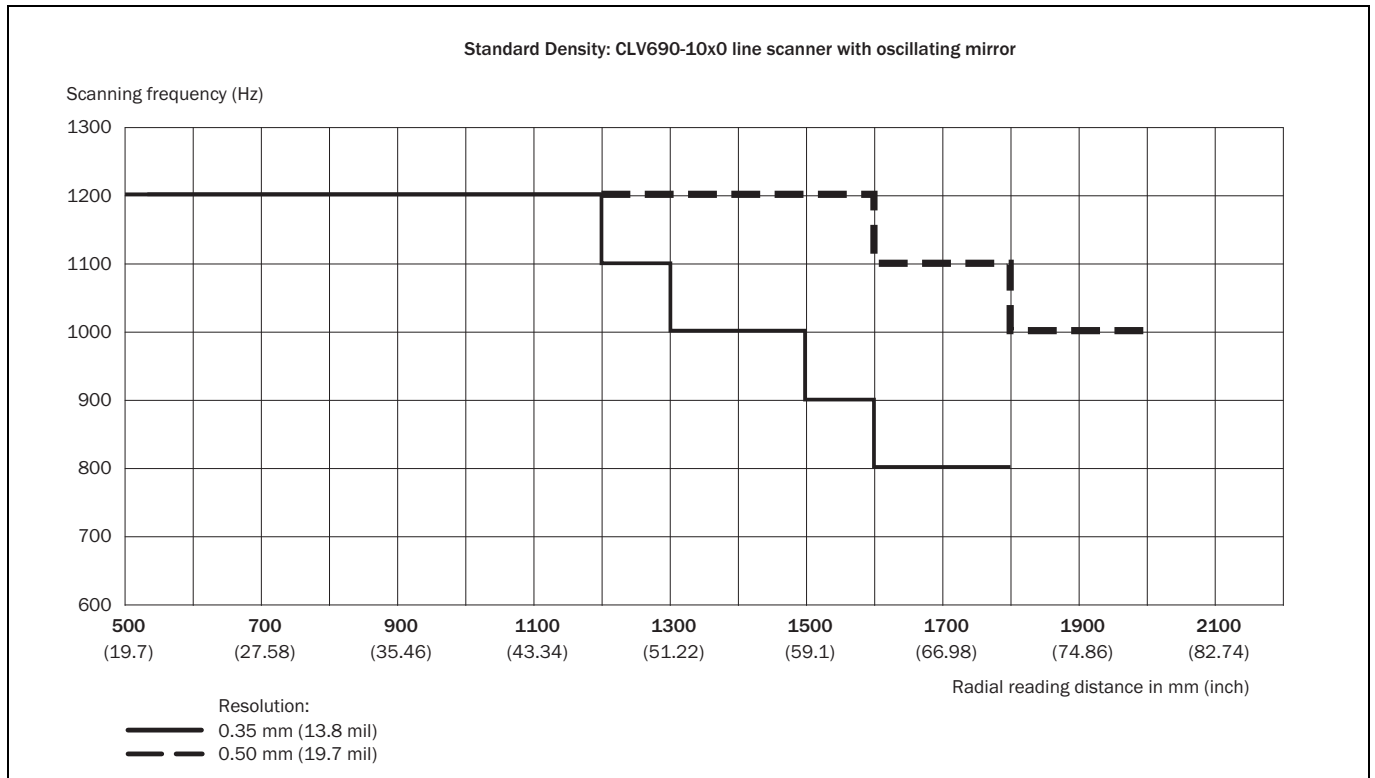


Fig. 4-12: CLV690-10x0 (Standard Density): Scanning frequency as a function of the radial reading distance and resolution

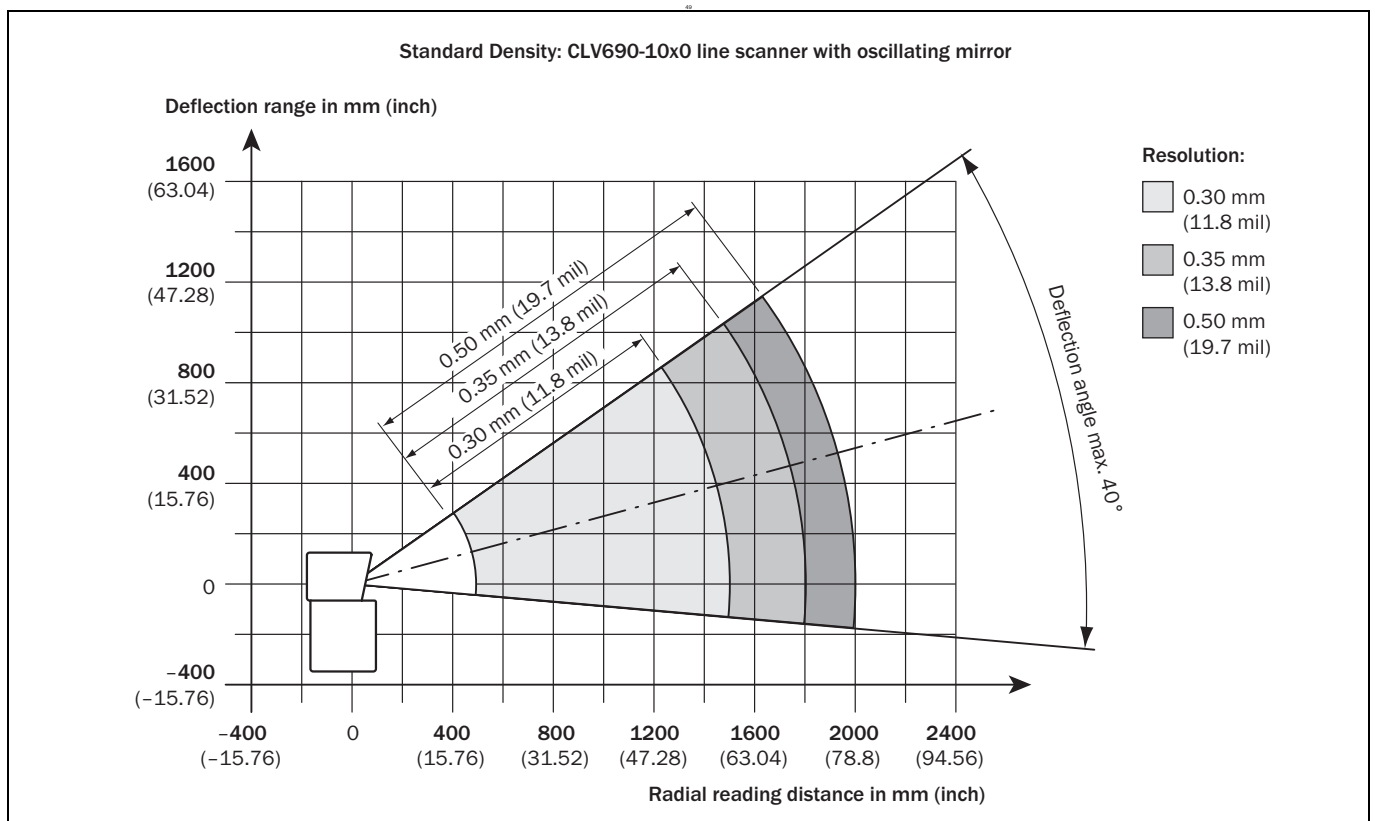


Fig. 4-13: CLV690-10x0 (Standard Density): Deflection range as a function of radial reading distance, deflection angle and resolution

4.2.3 Low Density: Reading performance data of line scanner

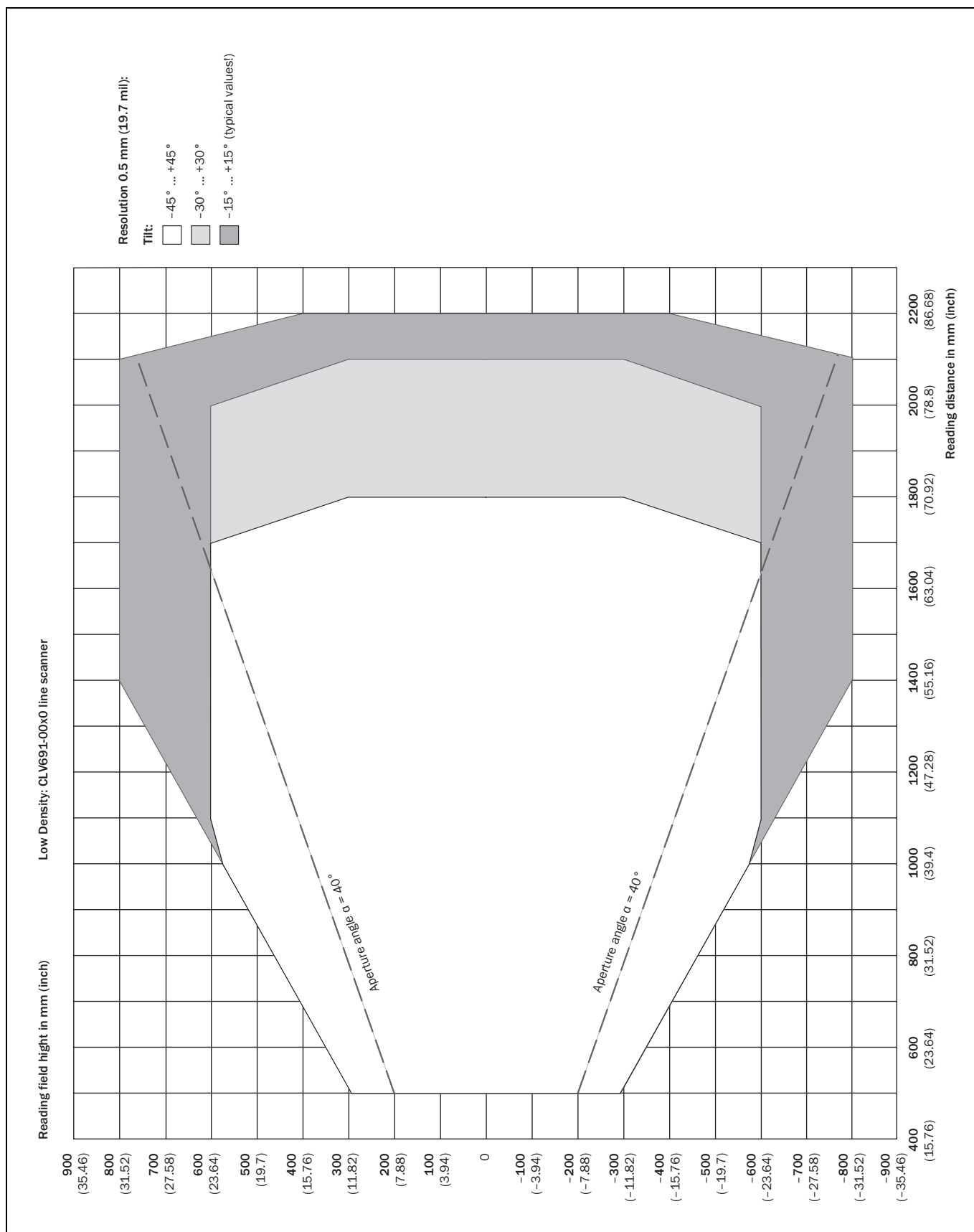


Fig. 4-14: CLV691-00x0 (Low Density): Reading field height as a function of the reading distance and the tilt at a resolution of 0.5 mm (19.7 mil)

CLV69x

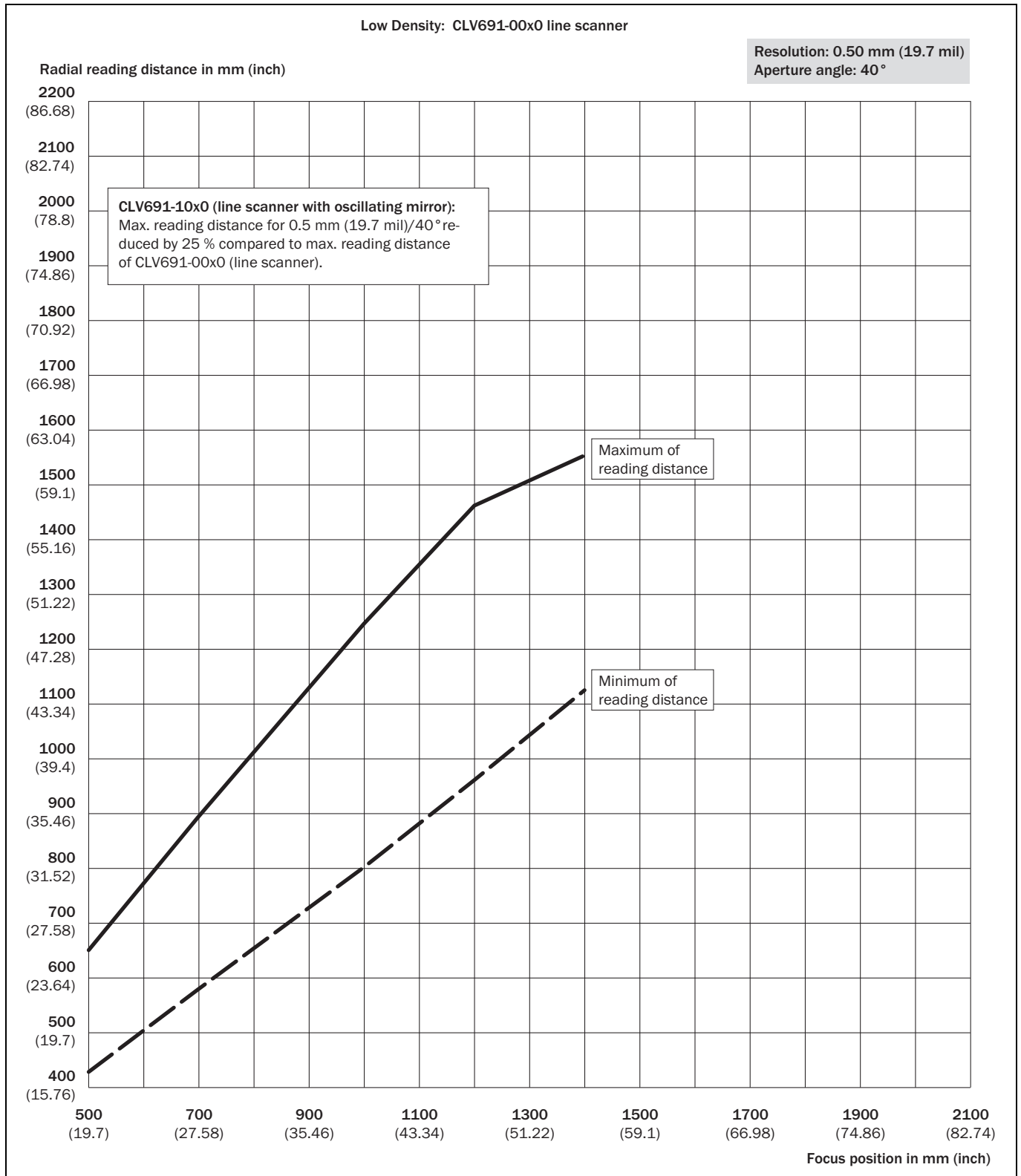


Fig. 4-15: CLV691-00x0 (Low Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.50 mm (19.7 mil) and an aperture angle of $\alpha = 40^\circ$

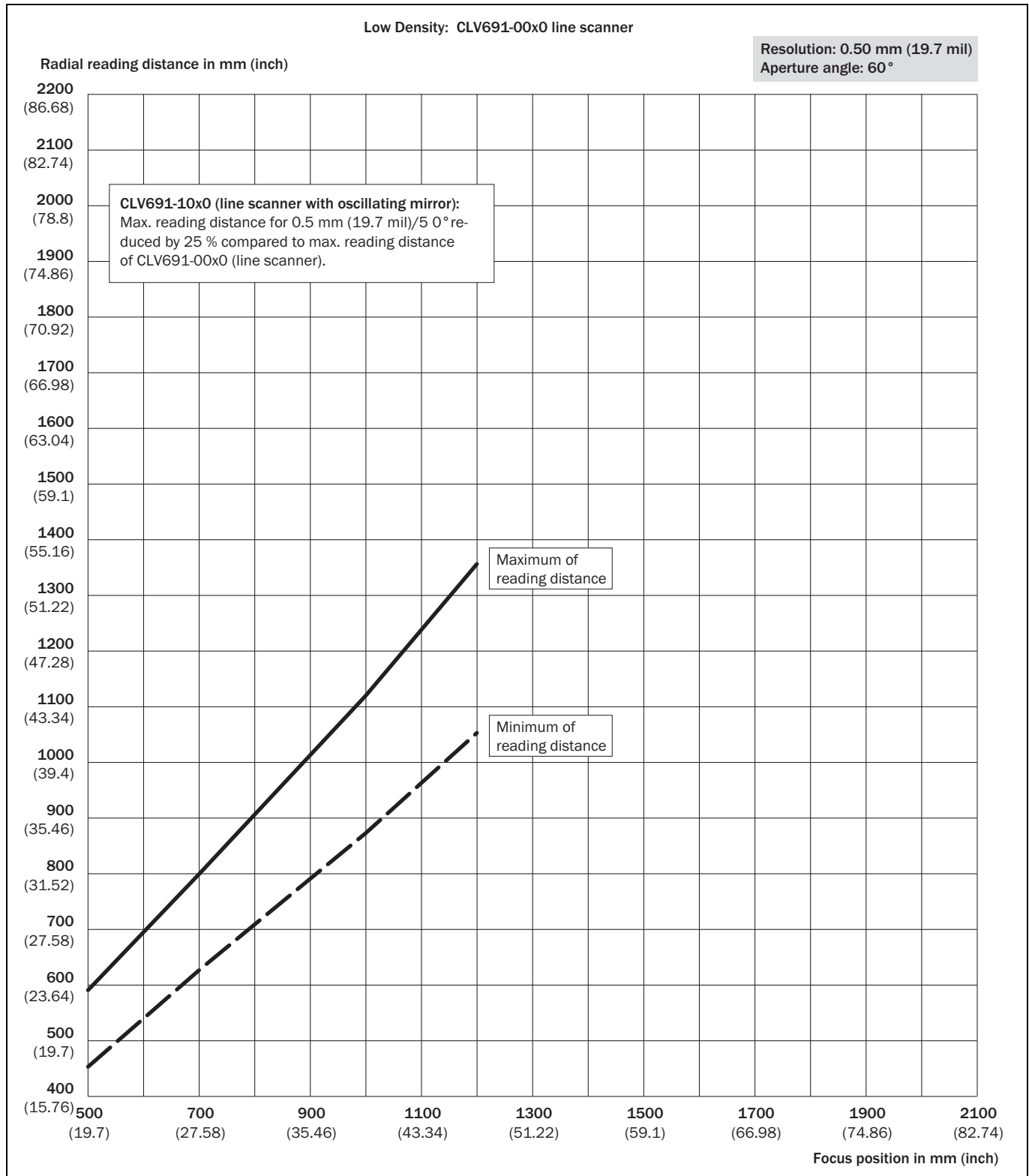


Fig. 4-16: CLV691-00x0 (Low Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.50 mm (19.7 mil) and an aperture angle of $\alpha = 60^\circ$

CLV69x

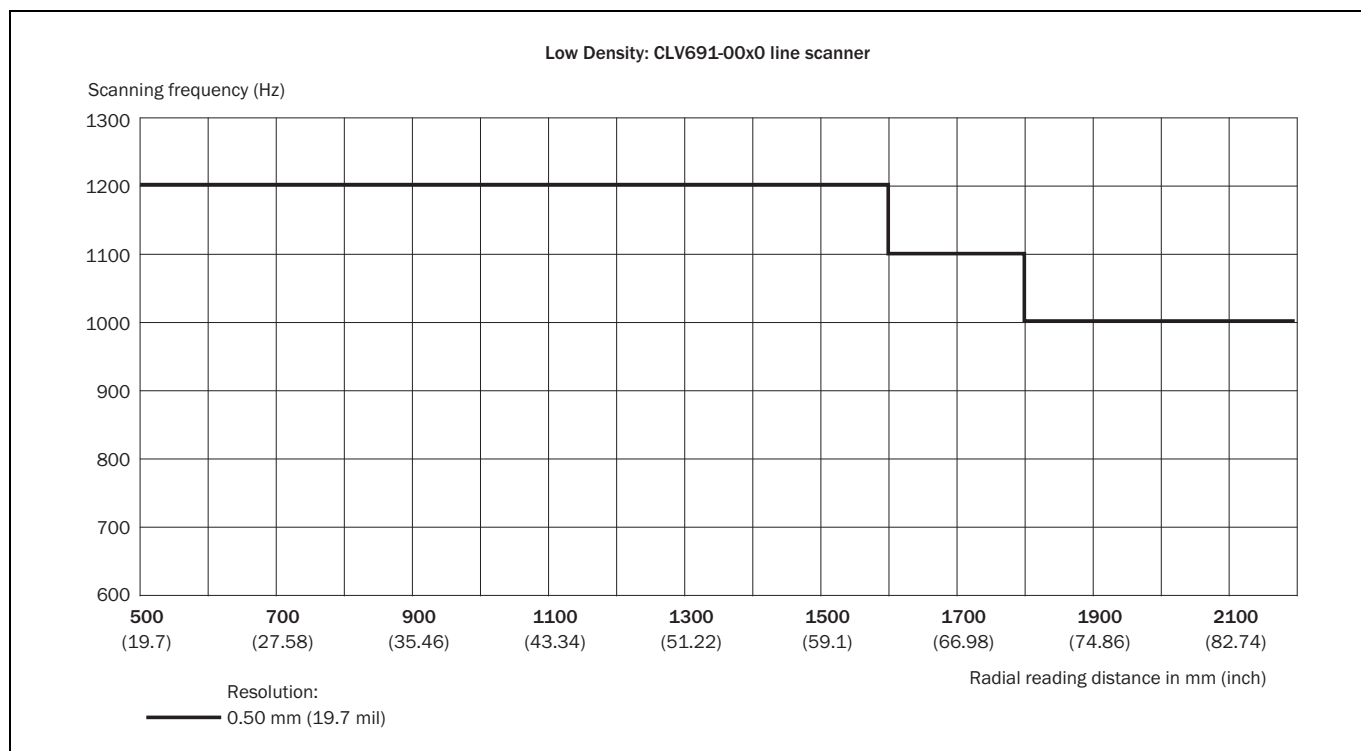


Fig. 4-17: CLV691-00x0 (Low Density): Scanning frequency as a function of the radial reading distance and resolution

4.2.4 Low Density: Reading performance data of line scanner with oscillating mirror

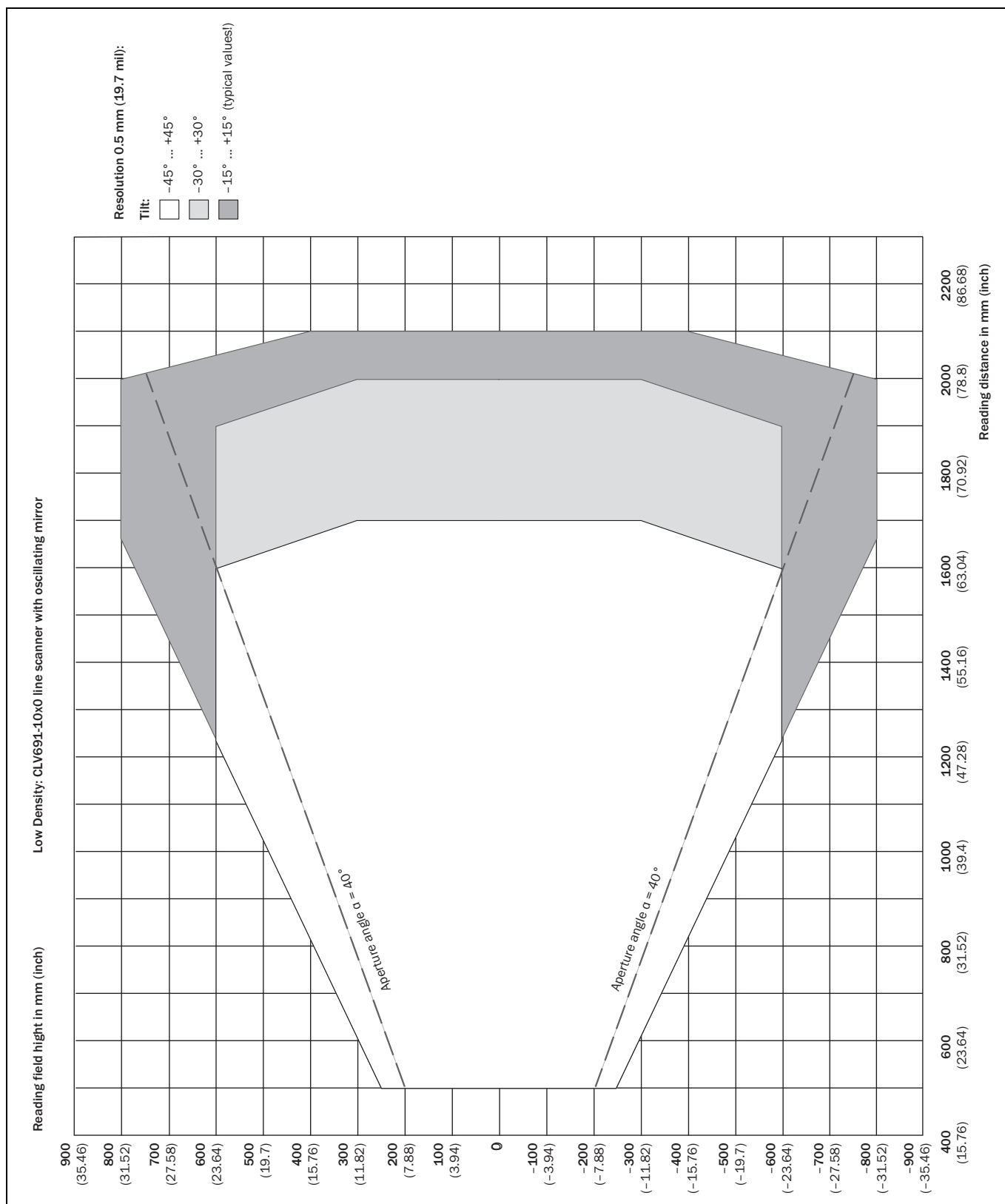


Fig. 4-18: CLV691-10x0 (Low Density): Reading field height as a function of the reading distance and the tilt at a resolution of 0.5 mm (19.7 mil)

Reading distances at a resolution of 0.5 mm (19.7 mil)/aperture angle 40°:

See [Fig. 4-15, Page 63](#).

CLV69x

Reading distances at a resolution of 0.5 mm (19.7 mil)/aperture angle 50°:

See Fig. 4-16, Page 64.

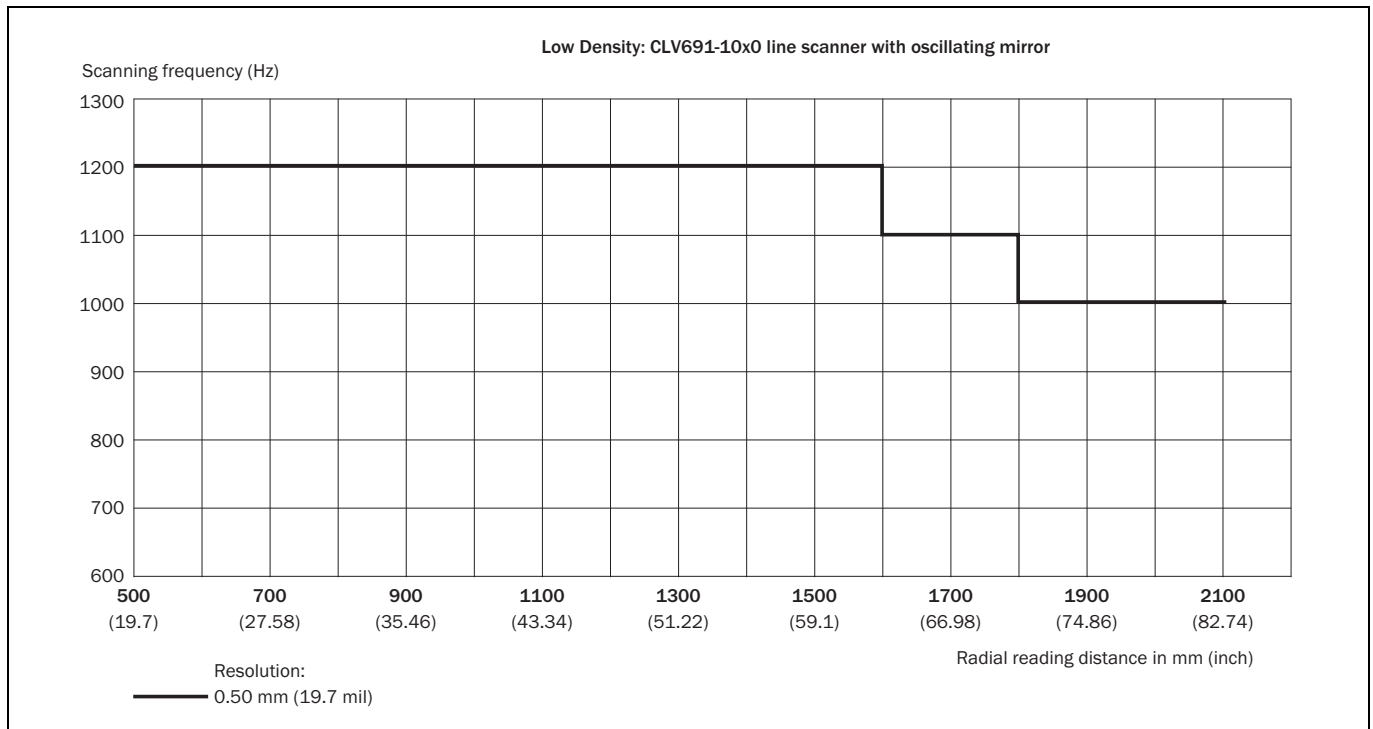


Fig. 4-19: CLV691-10x0 (Low Density): Scanning frequency as a function of the radial reading distance and resolution

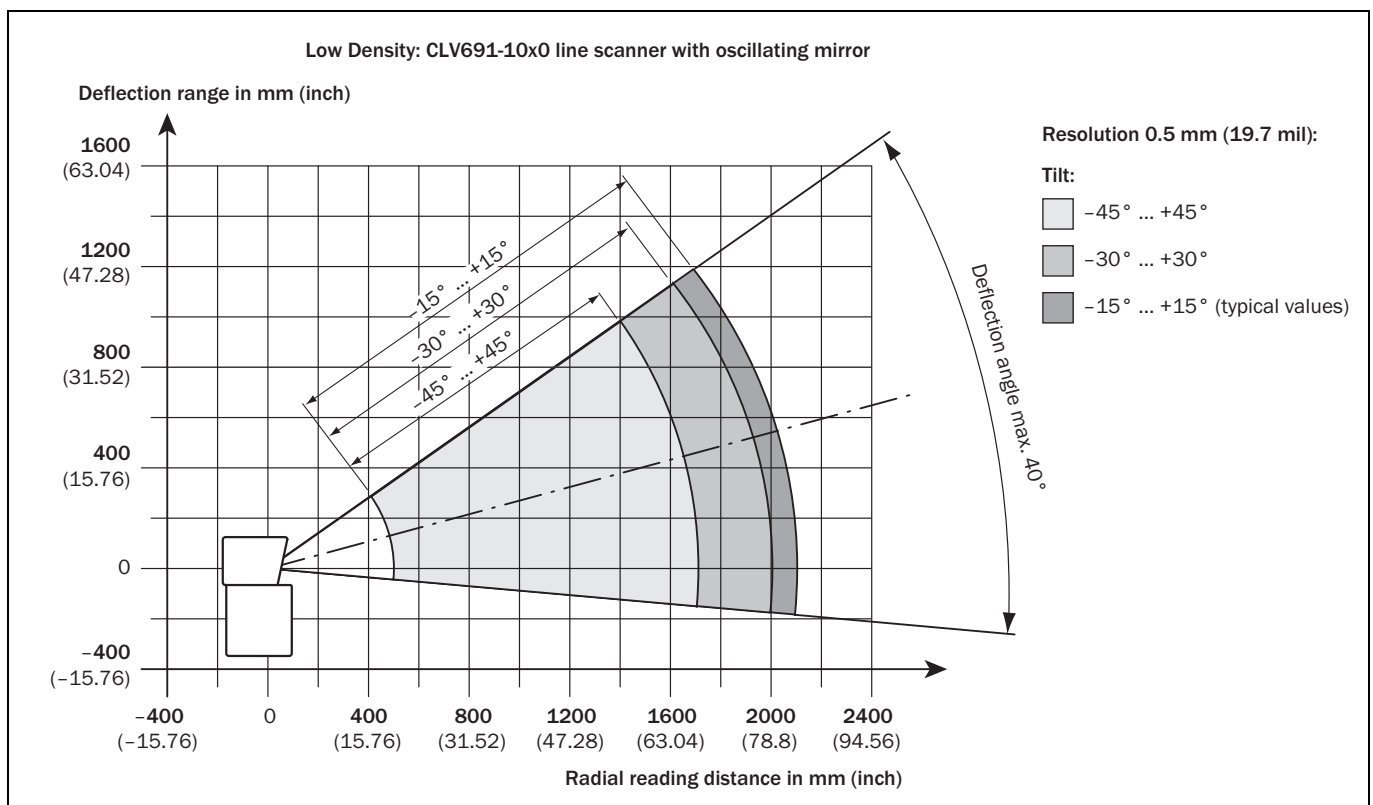


Fig. 4-20: CLV691-10x0 (Low Density): Deflection range as a function of radial reading distance, deflection range and tilt at a resolution of 0.5 mm (19.7 mil)

4.2.5 High Density: Reading performance data of line scanner

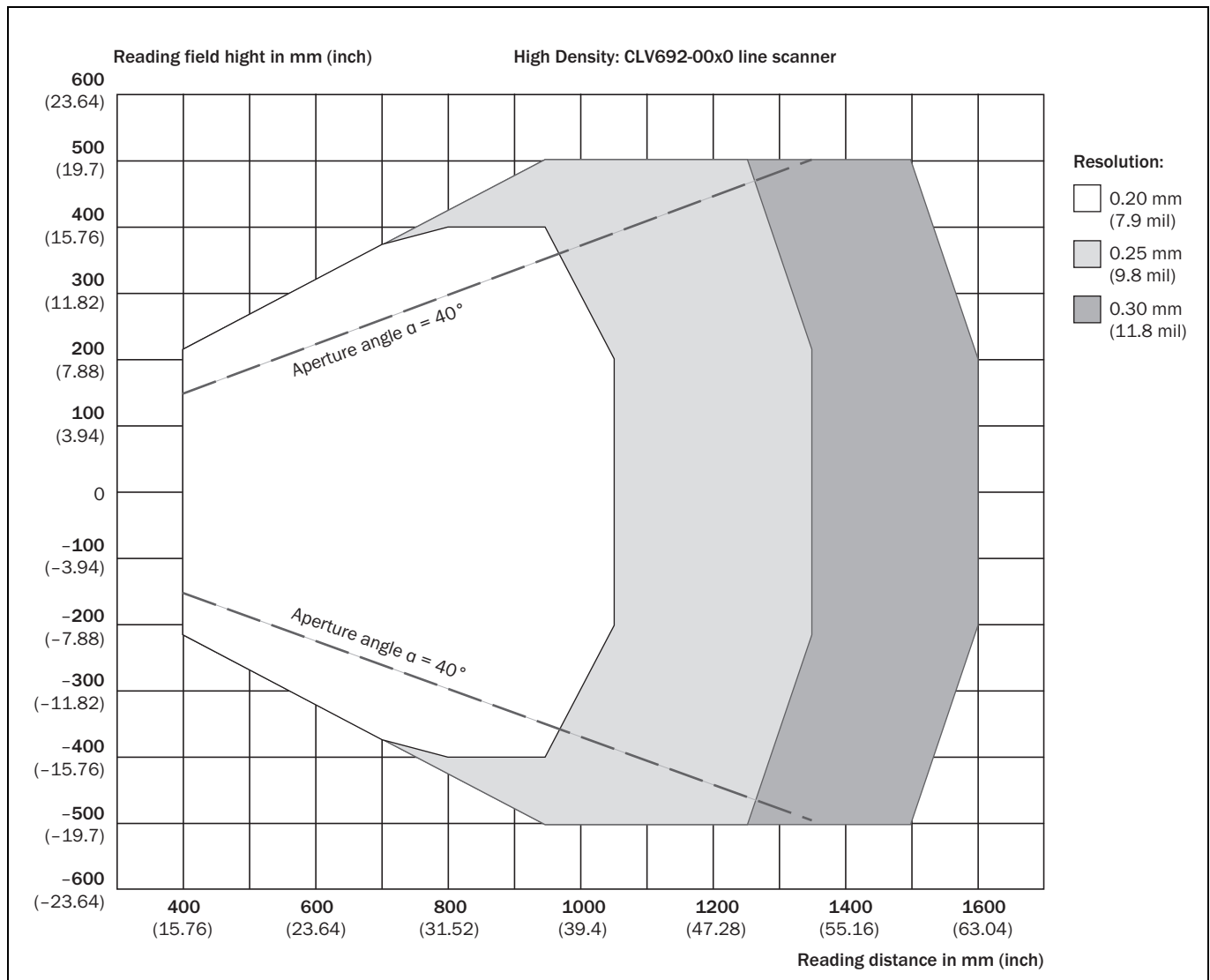


Fig. 4-21: CLV692-00x0 (High Density): Reading field height as a function of the reading distance and resolution

CLV69x

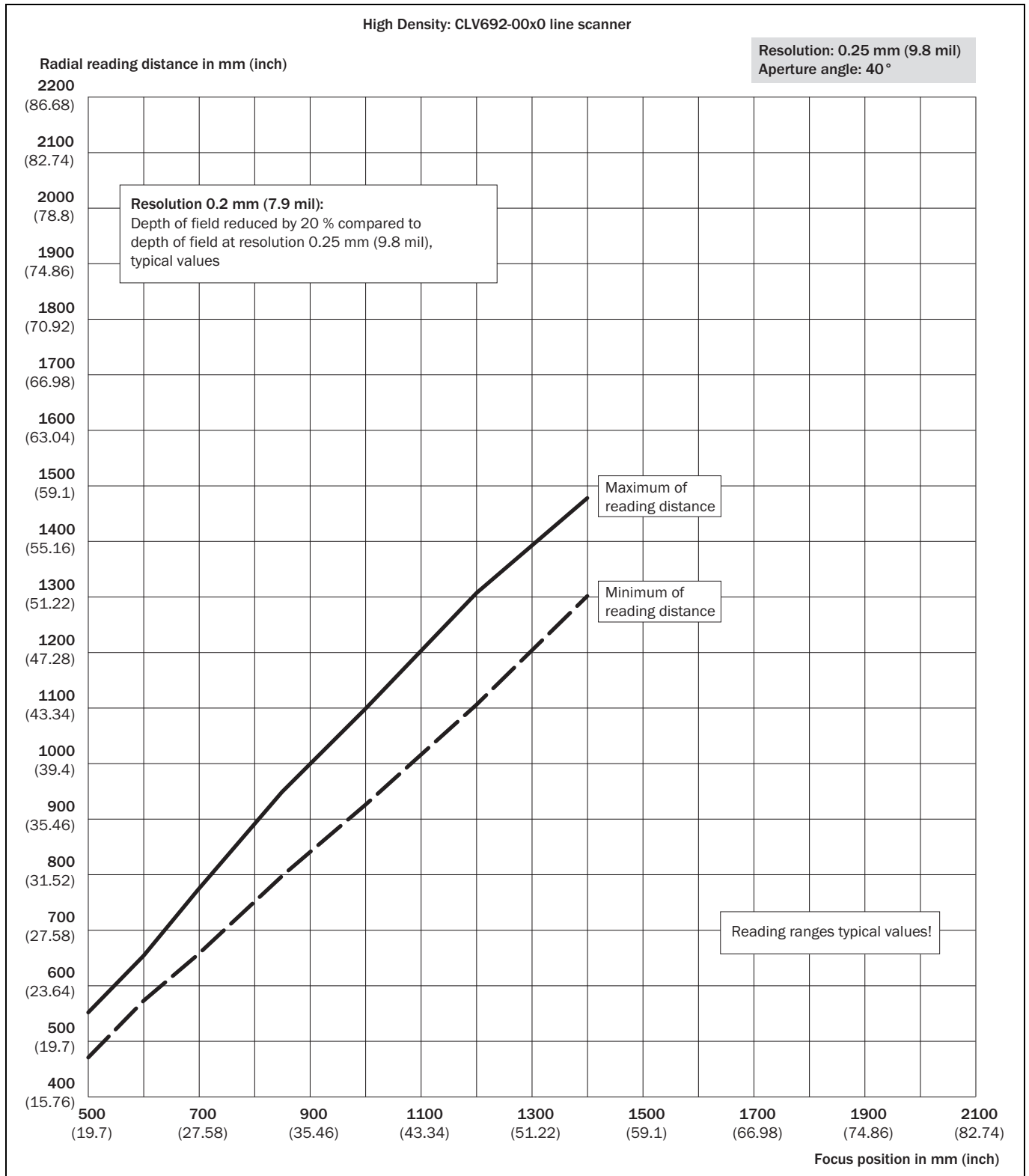


Fig. 4-22: CLV692-00x0 (High Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.25 mm (9.8 mil) and an aperture angle of $\alpha = 40^\circ$

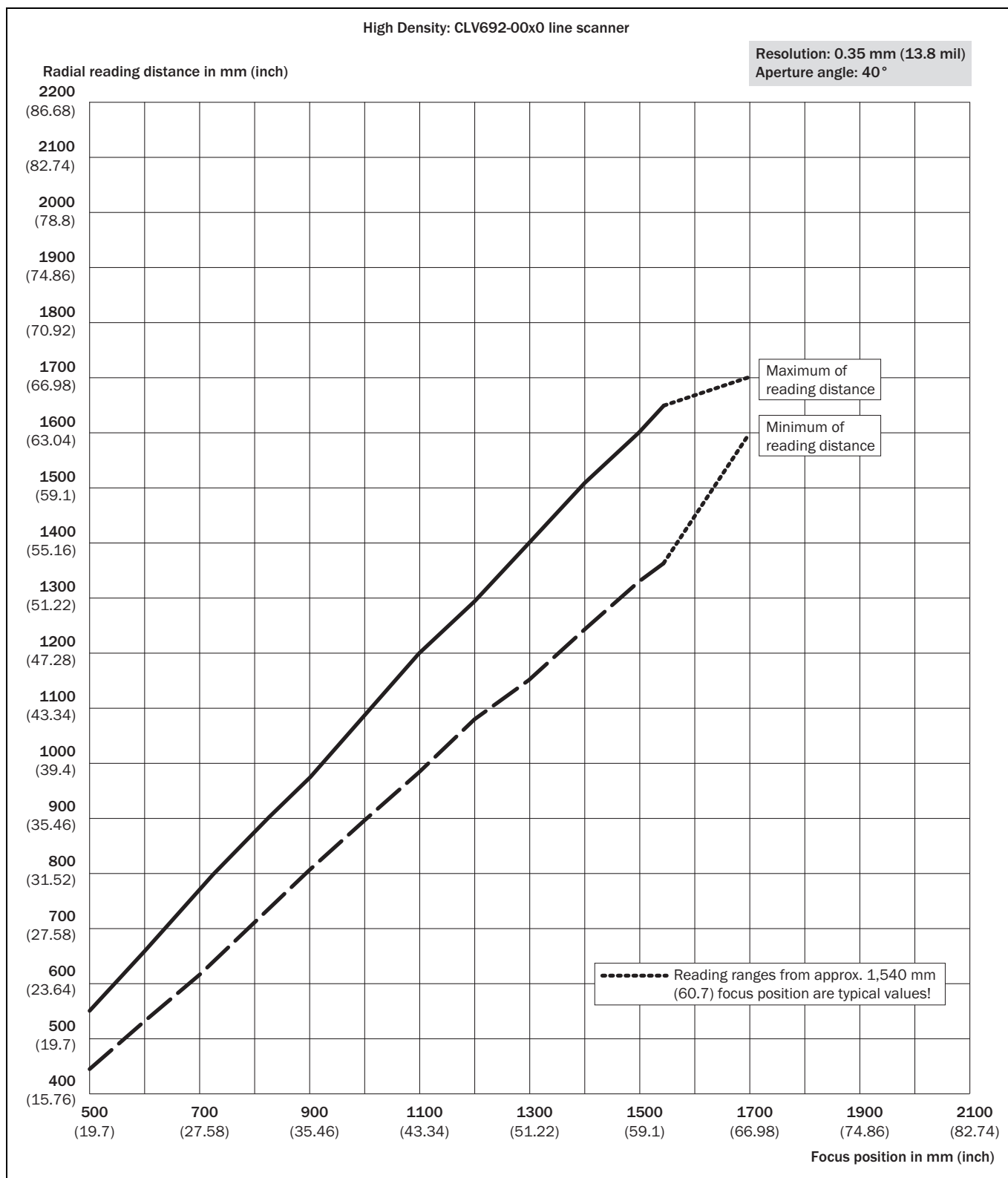


Fig. 4-23: CLV692-00x0 (High Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm (13.8 mil) and an aperture angle of $\alpha = 40^\circ$

CLV69x

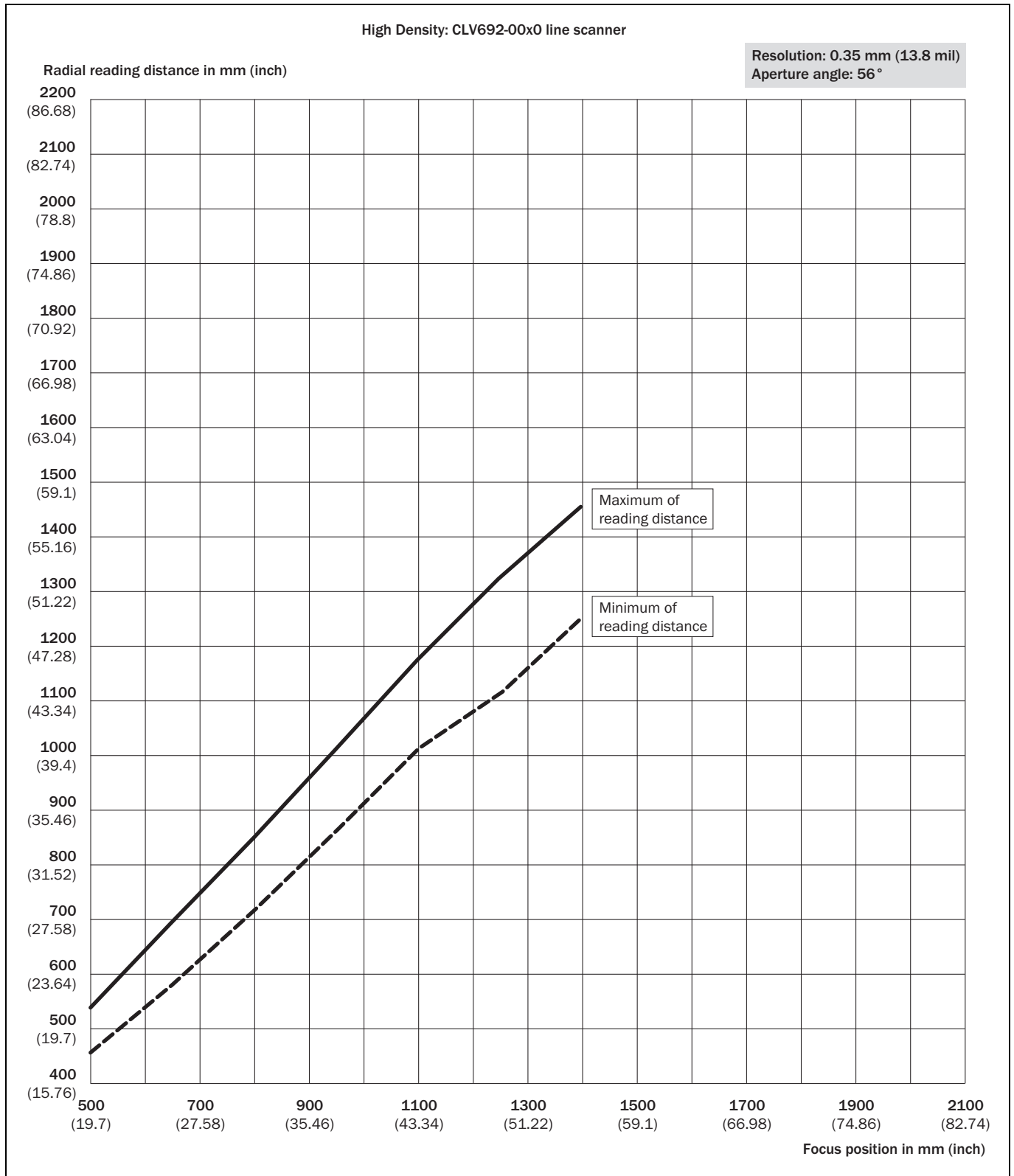


Fig. 4-24: CLV692-00x0 (High Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm (13.8 mil) and an aperture angle of $\alpha = 56^\circ$

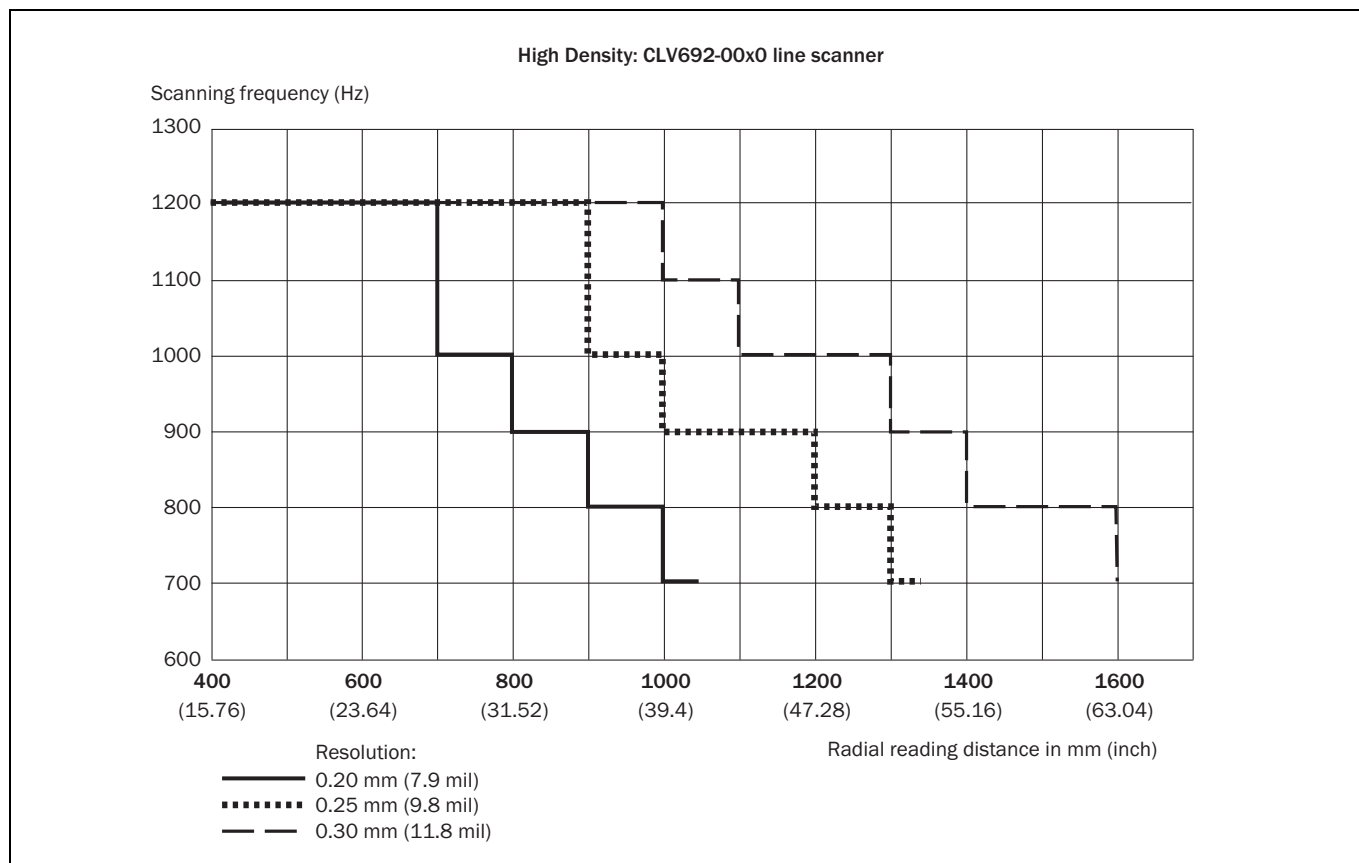


Fig. 4-25: CLV692-00x0 (High Density): Scanning frequency as a function of the radial reading distance and resolution

CLV69x

4.2.6 High Density: Reading performance data of line scanner with oscillating mirror

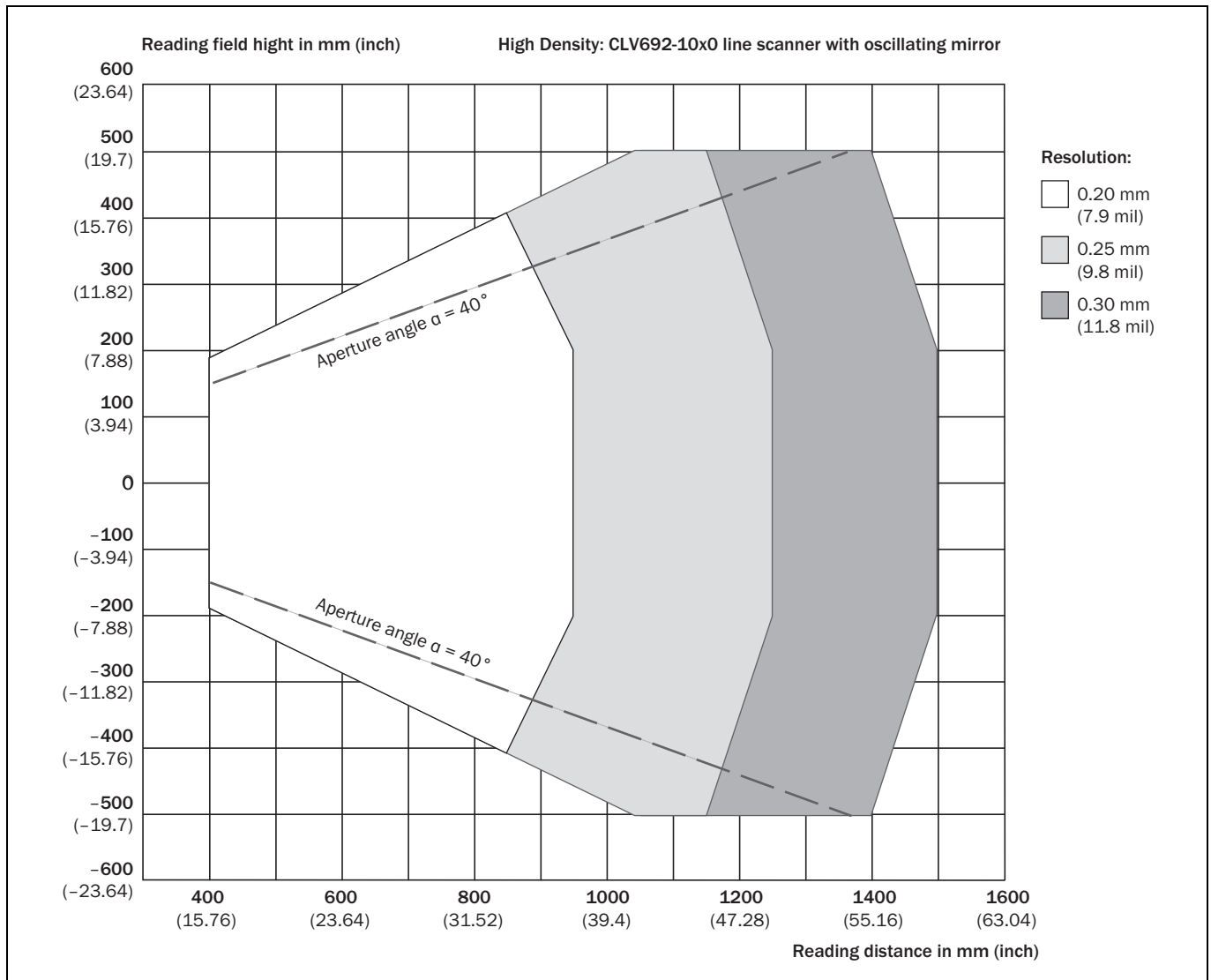


Fig. 4-26: CLV692-10x0 (High Density): Reading field height as a function of the reading distance and resolution

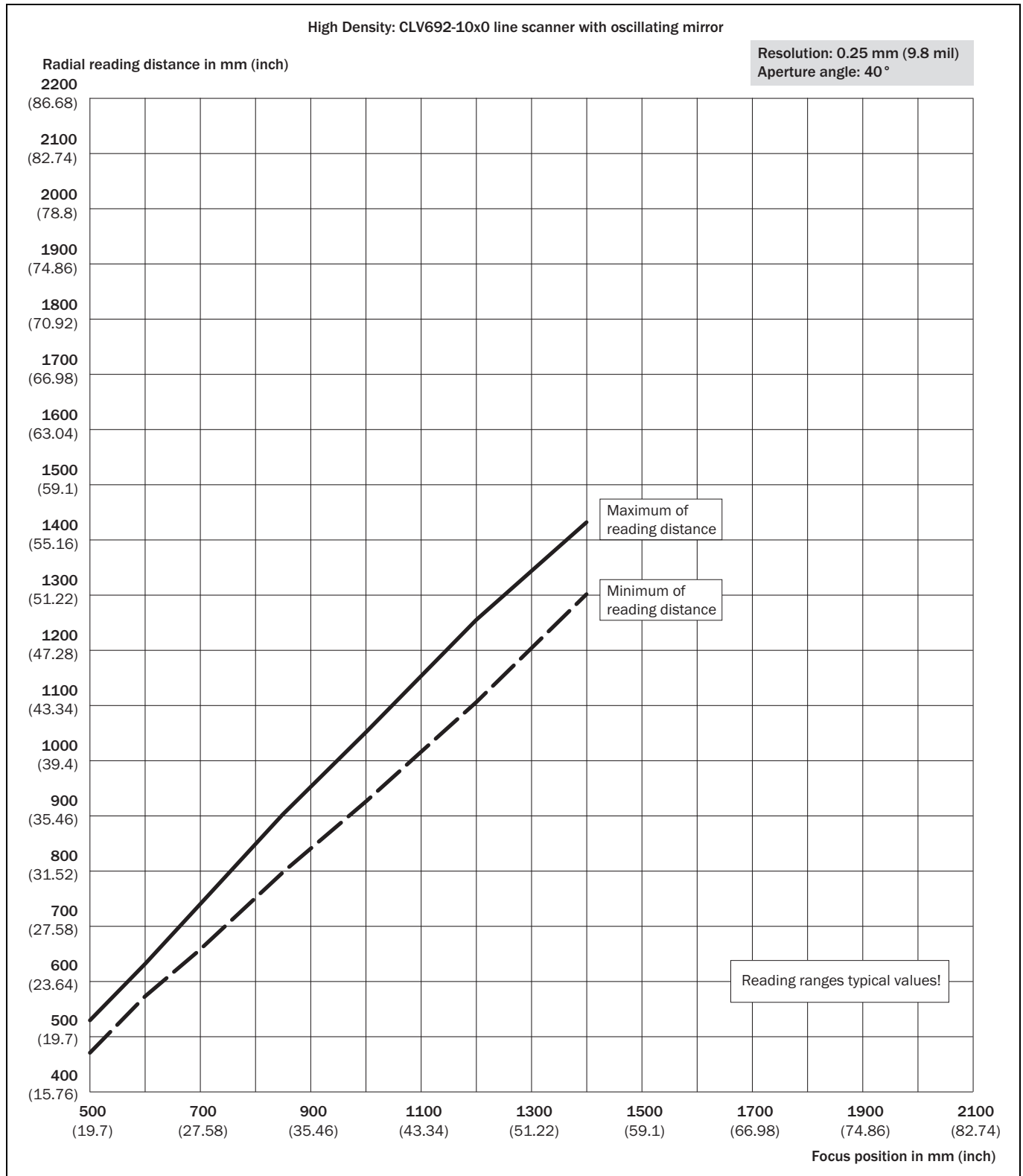


Fig. 4-27: CLV692-10x0 (High Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.25 mm (9.8 mil) and an aperture angle of $\alpha = 40^\circ$

CLV69x

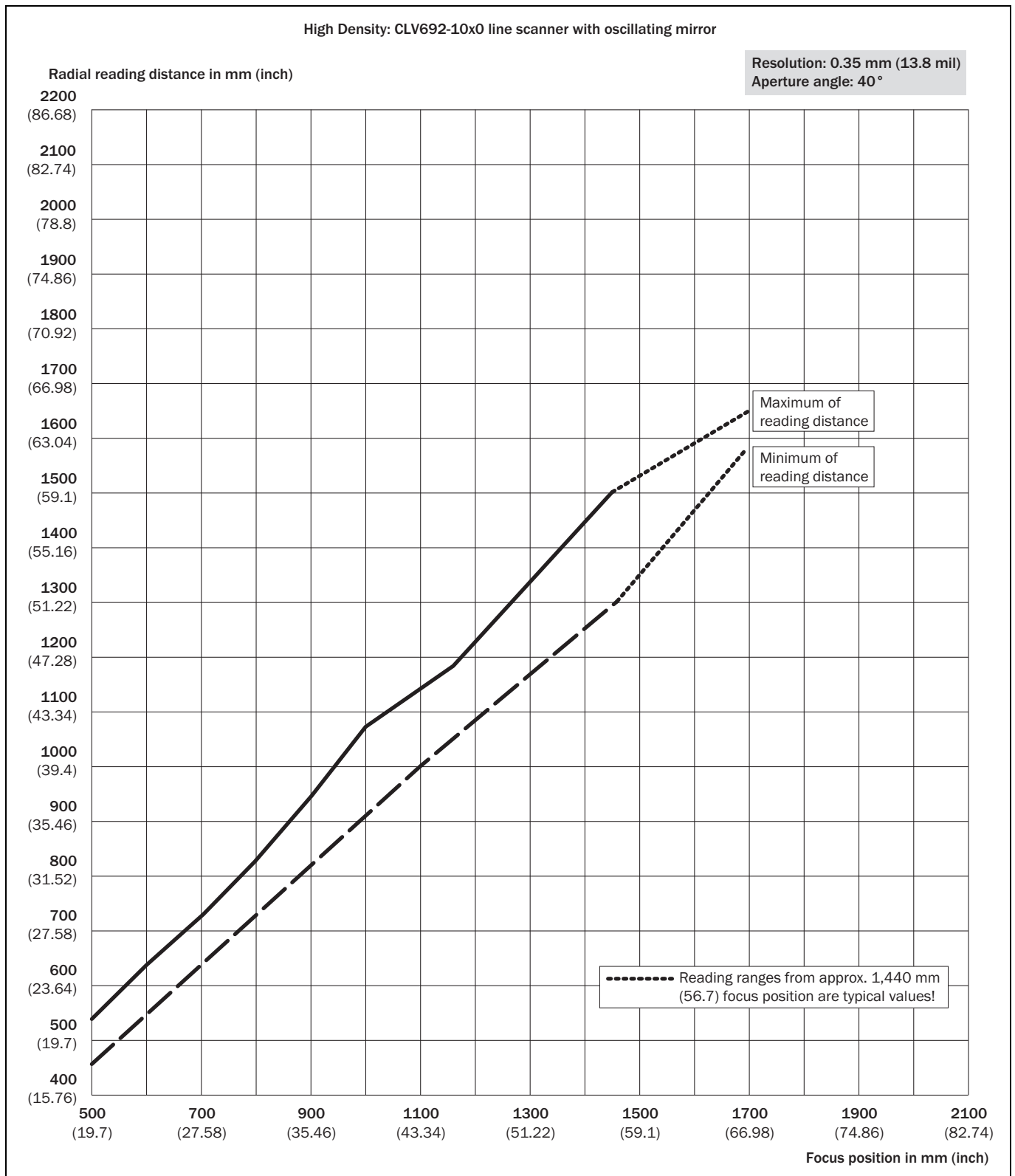


Fig. 4-28: CLV692-10x0 (High Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm (13.8 mil) and an aperture angle of $\alpha = 40^\circ$

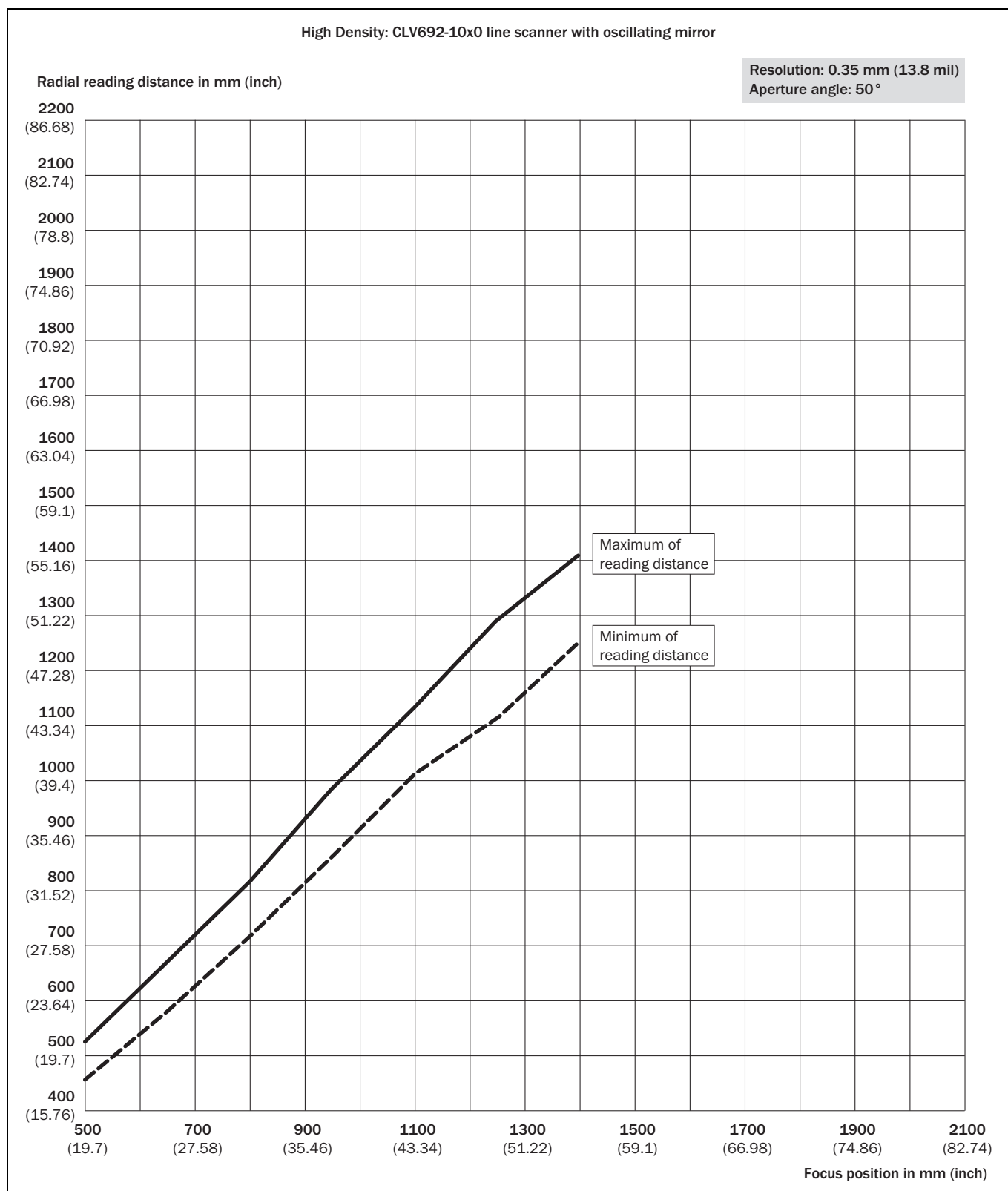


Fig. 4-29: CLV692-10x0 (High Density): Min. and Max. reading distance (measured radially) as a function of the focus position at a resolution of 0.35 mm (13.8 mil) and an aperture angle of $\alpha = 50^\circ$

CLV69x

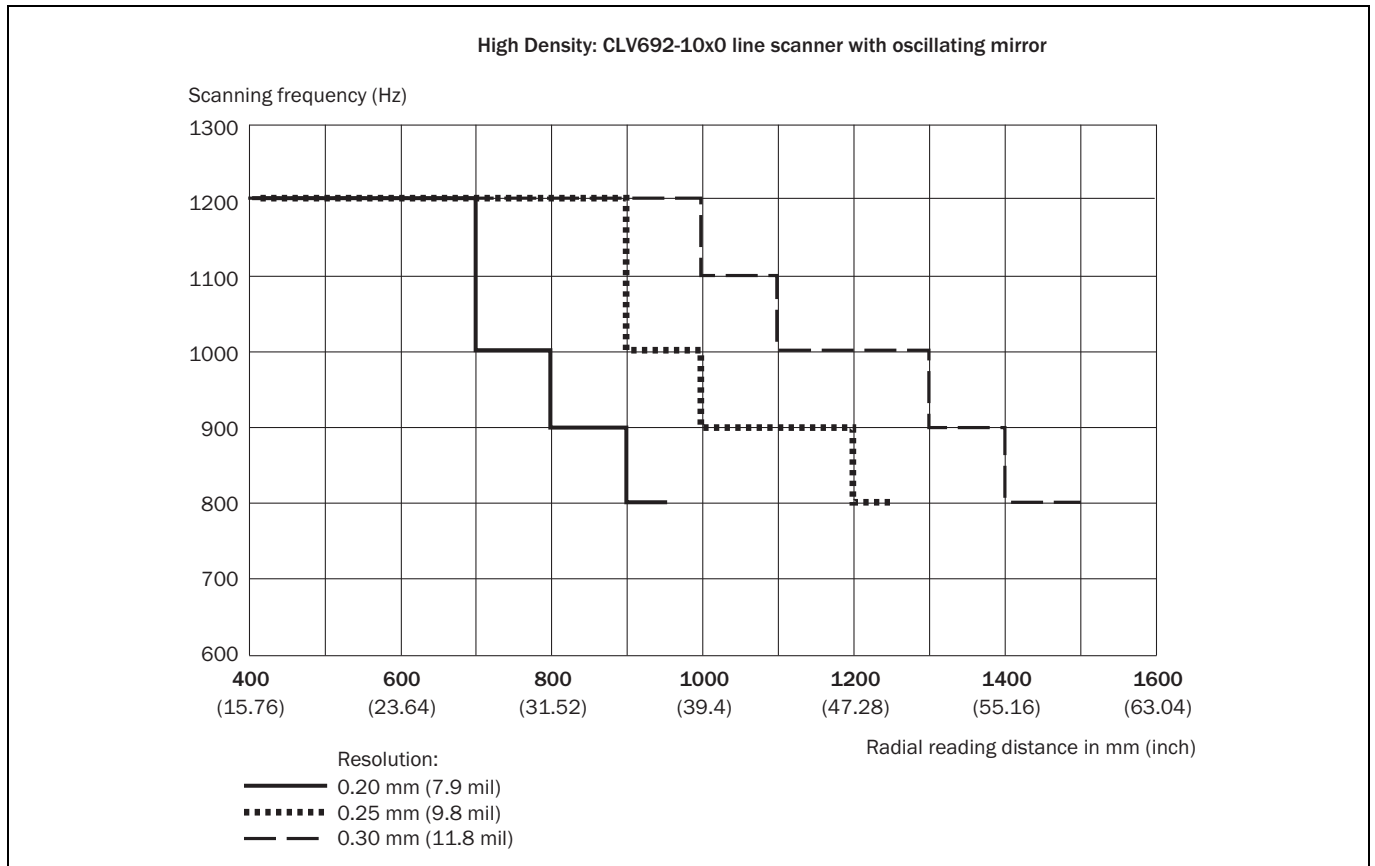


Fig. 4-30: CLV692-10x0 (High Density): Scanning frequency as a function of the radial reading distance and resolution

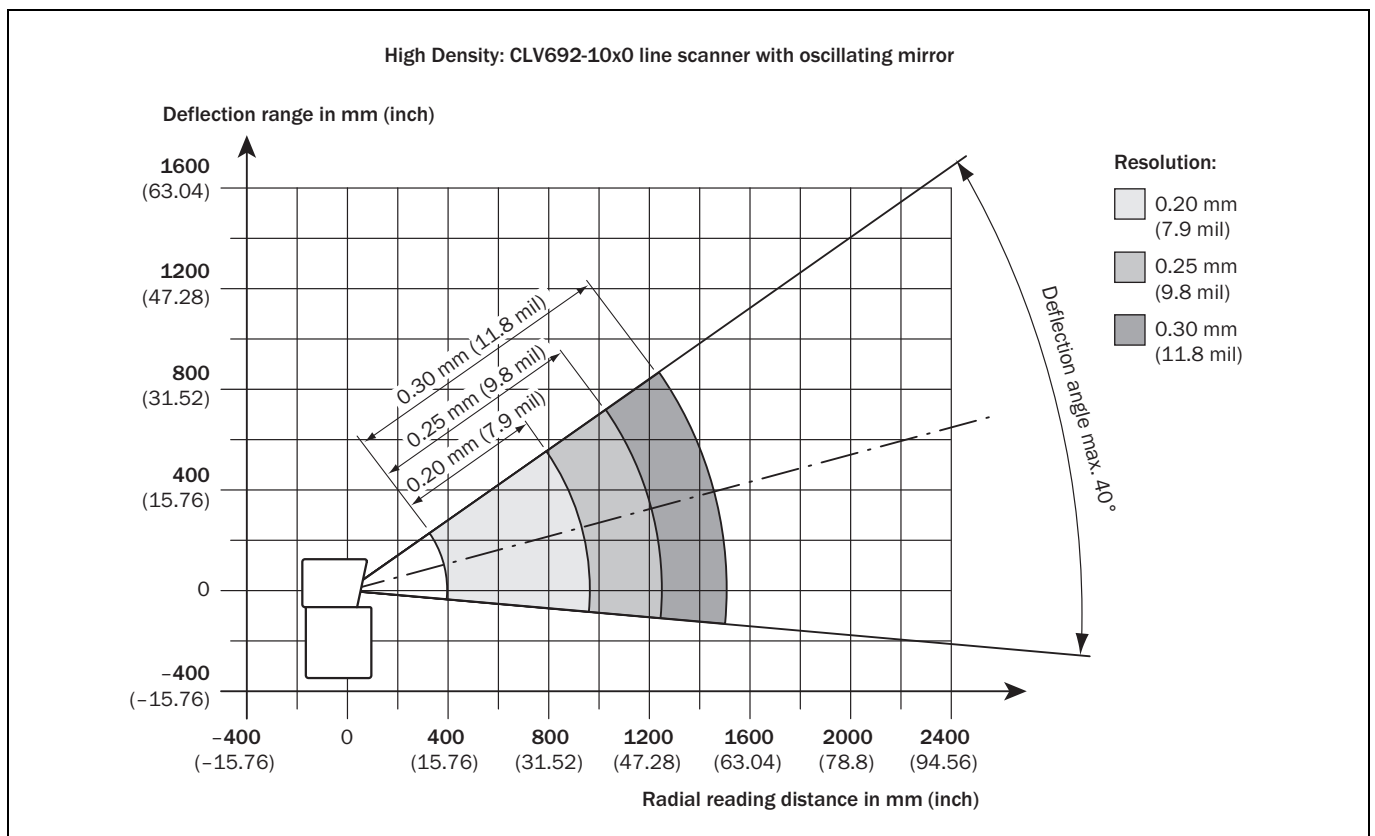


Fig. 4-31: CLV692-10x0 (High Density): Deflection range as a function of radial reading distance, deflection angle and resolution

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