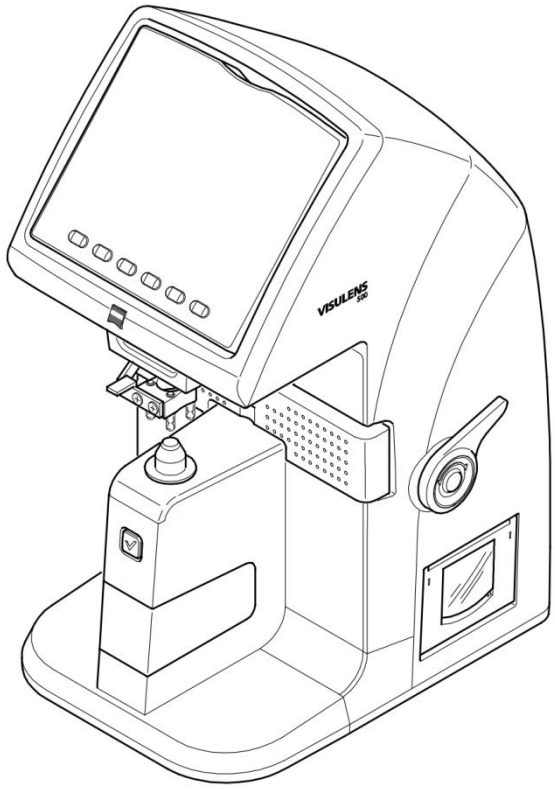
VISULENS 500
Digital Lensmeter

Interface Definition
Version 1.6



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Contents

1. General

1.1 Purpose

This documentation specifies the interface for data output from the VISULENS 500.

1.2 Definitions and Acronyms

ADD	Addition power
AXIS	Axis of cylinder
CYL	Cylinder
EMR	Electronic medical record
OS	Oculus sinister, left eye
OD	Oculus dexter, right eye
PD	Interpupillary distance
PX	X-directional prism power
PY	Y-directional prism power
UV	UV transmission ratio of the lens
SPH	Sphere
VD	Vertex distance

1.3 Tables

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2. Intended Use

A lensmeter (also known as a lensometer or focimeter), is an ophthalmic instrument used by opticians, ophthalmologists, optometrist and their staff as well as other professionals in the optical industry to determine the optical properties of lenses in a pair of eyeglasses or single uncut lenses.

A lensmeter is able to identify several specific optical properties (sphere/axis/cylinder) of lenses (single, bifocal, progressive,multifocal). Some can also measure the UV transmission of the lenses and provide you with the PD of the eyeglasses.

3. Connectors

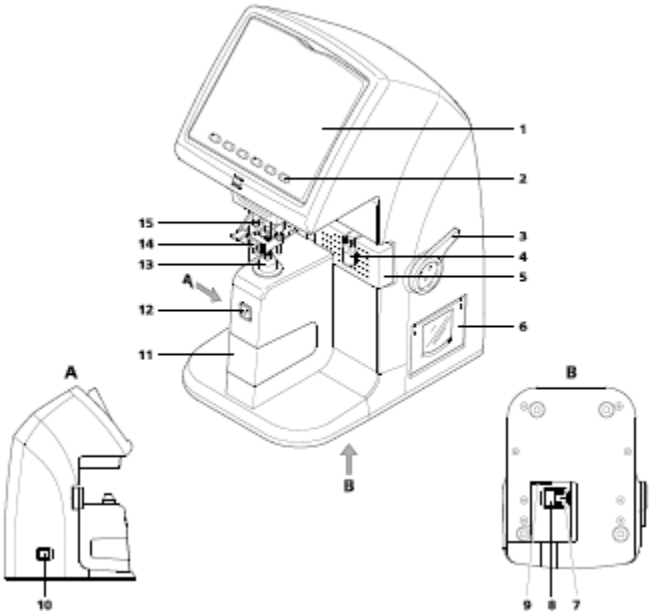

Figure 1 Connector location

1	Monitor	9	RS232 port
2	Function keys F1 to F6	10	Power switch
3	Lever for extending the lens table	11	UV cover
4	PD sensor	12	Memory button
5	Lens table	13	Lens support
6	Printer	14	Lens holder
7	Power input socket	15	Marker pens with lowering lever
8	Fuse compartment		

Table 1 Available connectors and data interfaces

3.1 RS232 Connector Pin Setup

The VISULENS 500 supports data output operations via the RS-232 serial interface via a DB9-type female connector. The pin configuration of this connector is shown in Table 3.

Pin	Signal	Pin	Signal
1	-	6	-
2	Transmit Data	7	-
3	Receive Data	8	-
4	-	9	-
5	Signal ground		

Table 2 Device serial port pin configuration

N.B.: connecting to a standard PC should be possible through a standard commercial version of the shelf 1:1 cable i.e. a cable with straight through connections, not crossing transmit and receive lines 2 (Received Data) and 3 (Transmitted Data), respectively (see Figure 2).

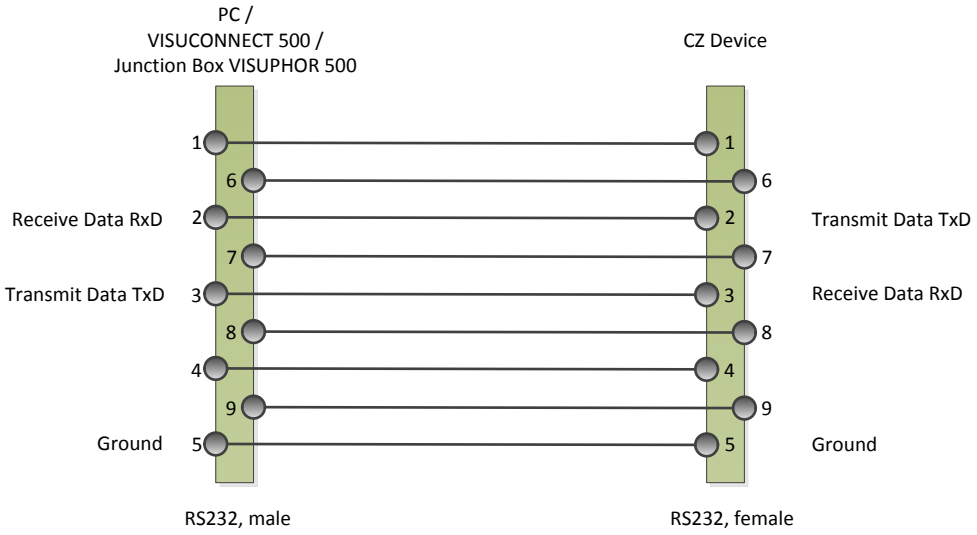

Figure 2 RS-232 DB 9 wiring configuration

3.2 Serial Interface Setup

Baud Rate:	19200
Data Bits:	8
Parity Bit:	No Parity Bit
Stop Bits:	1 Stop Bit
Code:	ASCII Code

Table 3 Default serial interface setup

3.3 Data Transmission Mode

The data is transferred via a serial interface as soon the user pushes the “Print” button located on the device. The mode of data transfer is push, the EMR system cannot initiate data queries from the device itself.

4. Definition of Serial Numbers

4.1 Overall Concept

For each initial device of a product variant a 10 digit *starting number* is defined according to the rules described in the following section. This number is then used to initialize a counter that rises by increments of one for all subsequent equivalent devices.

4.2 Starting Number

The structure of the starting number is defined according to the following definition:

1	2	3	4	5	6	7	8	9	10
P	**P**	**P**	**P**	**V**	**V**	**Y**	**Y**	**M**	**M**
Product code				**Product variant**		**Current calendar**		**Current month**	

Table 4 Starting number definition

Placeholder	Definition	Input
PPPP	Product code, for VISULENS 500	9702
VV	Product variant/version	Pre-series, start with: 00 Series, start with: 10, for each modification 02 is added, i.e. 10, 12, 14, etc.
YY	Last two digits of calendar year of production	13 stands for 2013
MM	Month of production	i.e. 10 stands for October

Table 5 Placeholders for starting number definition

5. Data Format

5.1 Obtained Data Overview

All transferred data is hexadecimal encoded. The following data is obtained using the VISULENS 500. The data stream length remains unchanged, regardless of the user-selected measurement mode.

Dataset	Length in bytes
Device name	14
Time stamp	18
Measured lens	4
Right lens refraction	69
Left lens refraction	69
PD total	7
Device serial number	14
Total	**195**

Table 6 Data set lengths

5.2 Definitions

Placeholder	Definition
[S]	"+" or "-",if not set: hex: 2A, int: 42
[N]	Number [0…9] , if not set: hex: 2A, int: 42
[H][H]	Hexadecimal value, [H] represents a value between [0…9] or a character between [A…F]
[X]	Character between [0…9] and [A…Z]
[E]	Defines side allocation mode of output measurements. Allowed values: [S] … Single lens allocated and measured (value: 0x53) [L] … Two lenses allocated, Left lens measured (value: 0x4C) [R] … Two lenses allocated, Right lens measured (value: 0x52) [B] … Two lenses allocated, Both measured (value: 0x42)

Table 7 Data format definitions

If a data set is not defined the data package values are set to the **default value hex 0x2A (int: 42).**

Fractional portion is separated by a period(Hex: 0x2E, int: 46), i.e. 2.50.

5.3 Control Characters

Character	Hex/Int	Definition
CR	0x0D / 13	Beginning / End of data set or data tag.
EOT	0x04 / 4	End of transmission, characterizes the end of transmission of a complete data set.
*	0x2A / 42	Measurement value not applicable, not set.

Table 8 Data format definitions

6. Data Stream

6.1 Device Name

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Device Name													
Data Stream (Hex)	**0D**	**0A**	**56**	**49**	**53**	**55**	**4C**	**45**	**4E**	**53**	**35**	**30**	**30**	**0D**
Character	CR	LF	V	I	S	U	L	E	N	S	5	0	0	CR
Integer (Dez)	13	10	86	73	83	85	76	69	78	83	53	48	48	13

6.2 Time Stamp

	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	Time Stamp		Year				Month		Day			Hour		Minute		Seconds		
Data Stream (Hex)	**20**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**[H][H]**	**[H][H]**	**[H][H]**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**[H][H]**	**[H][H]**	**[H][H]**	**0D**
Character		CR	[N]	[N]	[N]	[N]	[N]	[N]	[N]	[N]	CR	[N]	[N]	[N]	[N]	[N]	[N]	CR
Integer (Dez)	32	13									13							13

6.3 Measured Lens

	33	34	35	36
	Measured Lens		Lens	
Data Stream (Hex)	**20**	**0D**	**[H][H]**	**0D**
Character		CR	[E]	CR
Integer (Dez)	32	13		13

6.4 Right Lens Refraction including UV measurements

- Px and Py values are calculated using the following equations
  - Px = P cos(B) with P prism power in [cm/m] and B prism base in [rad]
  - Py = P sin(B) dto.
- If there is only one ADD-value is "ADD near" used and "ADD intermediate" is set to **.**.

	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	Right Eye				Right SPH [D]							Right CYL [D]						
Data Stream (Hex)	**20**	**0D**	**52**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**
Character		CR	R	CR	[S]	[N]	[N]	.	[N]	[N]	CR	[S]	[N]	[N]	.	[N]	[N]	CR
Integer (Dez)	32	13	82	13				46			13				46			13

55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
Right AXIS [°]				Right PX							Right PY						
[H][H]	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**
[N]	[N]	[N]	CR 13	[S]	[N]	[N]	. 46	[N]	[N]	CR 13	[S]	[N]	[N]	. 46	[N]	[N]	CR 13

73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
Right ADD NEAR						Right ADD INTERMEDIATE						Right UV [365nm]			
[H][H]	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**0D**
[S]	[N]	. 46	[N]	[N]	CR 13	[S]	[N]	. 46	[N]	[N]	CR 13	[N]	[N]	[N]	CR 13

89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Right UV [375nm]				Right UV [395nm]				Right UV [405nm]				Right PD [mm]				
[H][H]	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**0D**
[N]	[N]	[N]	CR 13	[N]	[N]	[N]	CR 13	[N]	[N]	[N]	CR 13	[N]	[N]	. 46	[N]	CR 13

6.5 Left Lens Refraction

- Px and Py values are calculated using the following equations
  - Px = P cos(B) with P prism power in [cm/m] and B prism base in [rad]
  - Py = P sin(B) dto.
- If there is only one ADD-value, "ADD near" is used and "ADD intermediate" is set to **.**.

	106	107	108	109	110	111	112	113	114	115	116
	Left Eye				Left SPH [D]						
Data Stream (Hex)	**20**	**0D**	**4C**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**
Character		CR	L	CR	[S]	[N]	[N]	.	[N]	[N]	CR
Integer (Dez)	32	13	76	13				46			13

117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134
Left CYL [D]							Left AXIS [°]				Left PX						
[H][H]	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**
[S]	[N]	[N]	.	[N]	[N]	CR	[N]	[N]	[N]	CR	[S]	[N]	[N]	.	[N]	[N]	CR
			46			13				13				46			13

135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153
Left PY							Left ADD NEAR						Left ADD INTERMEDIATE					
[H][H]	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**[H][H]**	**0D**
[S]	[N]	[N]	. 46	[N]	[N]	CR 13	[S]	[N]	. 46	[N]	[N]	CR 13	[S]	[N]	. 46	[N]	[N]	CR 13

154	155	156	157	158	159	160	161	162	163	164	165
Left UV [365nm]				Left UV [375nm]				Left UV [395nm]			
[H][H]	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**[H][H]**	**0D**
[N]	[N]	[N]	CR 13	[N]	[N]	[N]	CR 13	[N]	[N]	[N]	CR 13

166	167	168	169	170	171	172	173	174
Left UV [405nm]				Left PD [mm]				
[H][H]	**[H][H]**	**[H][H]**	**0D**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**0D**
[N]	[N]	[N]	CR 13	[N]	[N]	. 46	[N]	CR 13

6.6 PD Total

	175	176	177	178	179	180	181
	PD total						
Data Stream (Hex)	**20**	**0D**	**[H][H]**	**[H][H]**	**2E**	**[H][H]**	**0D**
Character		CR	[N]	[N]	.	[N]	CR
Integer (Dez)	32	13			46		13

6.7 Device Serial Number

	182	183	184	185	186	187	188	189	190	191	192	193	194	195
	SN													
Data Stream (Hex)	**20**	**0D**	**39**	**37**	**30**	**32**	**[H][H]**	**[H][H]**	**[H][H]**	**[H][H]**	**[H][H]**	**[H][H]**	**0D**	**04**
Character		CR	9	7	0	2	[X]	[X]	[X]	[X]	[X]	[X]	CR	EOT
Integer (Dez)	32	13											13	4

7. Example Data Set

In this scenario only right lens refraction is measured.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Text	CR	LF	V	I	S	U	L	E	N	S	5	0	0	CR		CR	2	0	1	3	0	3	2	5	CR
Int	13	10	86	73	83	85	76	69	78	83	53	48	48	13	32	13	50	48	49	51	48	51	50	53	13
Hex	0D	0A	56	49	53	55	4C	45	4E	53	35	30	30	0D	20	0D	32	30	31	33	30	33	32	35	0D

26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
1	7	3	3	2	3	CR		CR	R	CR		CR	R	CR	-	0	4	.	0	3	CR	+	0	0
49	55	51	51	50	51	13	32	13	82	13	32	13	82	13	45	48	52	46	48	51	13	43	48	48
31	37	33	33	32	33	0D	20	0D	52	0D	20	0D	52	0D	2D	30	34	2E	30	33	0D	2B	30	30

51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
.	5	0	CR	0	5	5	CR	-	0	0	.	1	6	CR	+	0	1	.	5	2	CR	+	1	.
46	53	48	13	48	53	53	13	45	48	48	46	49	54	13	43	48	49	46	53	50	13	43	49	46
2E	35	30	0D	30	35	35	0D	2D	30	30	2E	31	36	0D	2B	30	31	2E	35	32	0D	2B	31	2E

76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
9	3	CR	+	1	.	0	0	CR	0	0	0	CR	0	0	0	CR	0	0	0	CR	0	0	0	CR
57	51	13	43	49	46	48	48	13	48	48	48	13	48	48	48	13	48	48	48	13	48	48	48	13
39	33	0D	2B	31	2E	30	30	0D	30	30	30	0D	30	30	30	0D	30	30	30	0D	30	30	30	0D

101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
0	0	.	0	CR		CR	L	CR	*	*	*	.	*	*	CR	*	*	*	.	*	*	CR	*	*
48	48	46	48	13	32	13	76	13	42	42	42	46	42	42	13	42	42	42	46	42	42	13	42	42
30	30	2E	30	0D	20	0D	4C	0D	2A	2A	2A	2E	2A	2A	0D	2A	2A	2A	2E	2A	2A	0D	2A	2A

126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
*	CR	*	*	*	.	*	*	CR	*	*	*	.	*	*	CR	*	*	*	*	*	CR	*	*	*
42	13	42	42	42	46	42	42	13	42	42	42	46	42	42	13	42	42	42	42	42	13	42	42	42
2A	0D	2A	2A	2A	2E	2A	2A	0D	2A	2A	2A	2E	2A	2A	0D	2A	2A	2A	2A	2A	0D	2A	2A	2A

151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
*	*	CR	*	*	*	CR	*	*	*	CR	*	*	*	CR	*	*	*	CR	*	*	*	*	CR	
42	42	13	42	42	42	13	42	42	42	13	42	42	42	13	42	42	42	13	42	42	42	42	13	14
2A	2A	0D	2A	2A	2A	0D	2A	2A	2A	0D	2A	2A	2A	0D	2A	2A	2A	0D	2A	2A	2A	2A	0D	0E

176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195
CR	1	2	.	0	CR		CR	9	7	0	2	1	0	1	3	0	9	CR	EOT
15	49	50	46	48	13	14	15	16	17	18	19	20	21	22	23	24	25	26	4
0F	31	32	2E	30	0D	0E	0F	10	11	12	13	14	15	16	17	18	19	1A	04

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