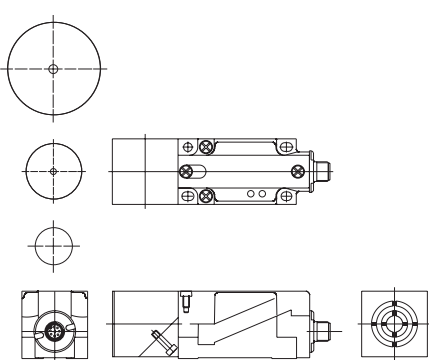
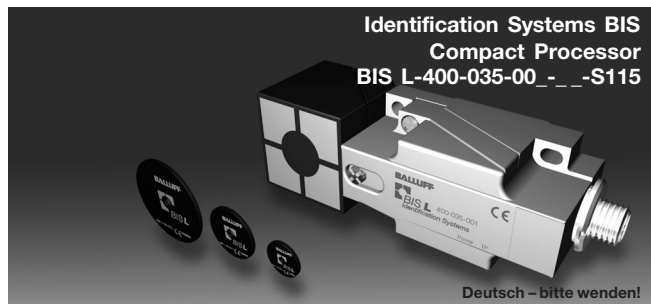


1

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sensors worldwide



Manual



Identification Systems BIS
Compact Processor
BIS L-400-035-00 - - -S115

Deutsch – bitte wenden!

2

No. 835 996 D/E • Edition 0803
Specifications subject to change.
Replaces edition 0710.

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Safety Notes

Proper use and operation	BIS L-4_ _ processor together with the other BIS L system components comprise the Identification System and may only be used for this purpose in industrial applications corresponding to Class A of the EMC Directive.
Installation and operation	<p>Installation and operation are permitted by trained specialists only. Unauthorized modifications and improper use will result in loss of the right to make warranty and liability claims.</p> <p>When installing the processor, follow exactly the connection diagrams provided later in this document. Take special care when connecting the processor to external controllers, especially with respect to the selection and polarity of the connections including the power supply.</p> <p>Only approved power supplies may be used. For specific information, see the Technical Data section.</p>
Deployment and inspection	<p>When deploying the identification system, all relevant safety regulations must be followed. In particular, measures must be taken to ensure that any defect in the identification system does not result in a hazard to persons or equipment.</p> <p>This includes maintaining the permissible ambient conditions and regular inspection for proper function of the identification system and all the associated components.</p>
Malfunction	At the first sign that the identification system is not working properly, it should be taken out of service and guarded against unauthorized use.
Scope	This document applies to the processor BIS L-400-035-00_00-S115 and BIS L-400-035-00_02-S115 (Software version V1.2 and higher).

5

Introduction BIS L-400 Identification System

This manual is intended to guide the user in installing and commissioning the components in the BIS L-400 identification system, so that start-up time is reduced to an absolute minimum.

Principle

The BIS L-400 identification system belongs to the category of
read-only, non-contacting systems.

This function enables applications in which information which has been pre-coded into the data carriers can be read out and used for further processing.

Applications

The main areas of application include

- **in production for controlling material flow**
(e.g., for part-specific processes),
in workpiece transport using conveying systems,
for obtaining safety-relevant data,
- **in process materials organization.**

System component function

The processor and the read head form a compact unit which is contained in a plastic housing.

The data carrier represents an independent unit. It does not require line-fed power and receives its energy from the integrated read head in the BIS L-400 identification system. The read head continuously sends a carrier signal which supplies the data carrier as soon as the latter has reached the required distance from the read head. The read process takes place during this phase. The data are output in 8-bit blocks over 8 parallel data lines and made available to the host system. These host systems may be:

- a control computer (e.g., industrial PC) having a parallel port, or
- a programmable logic controller (PLC).

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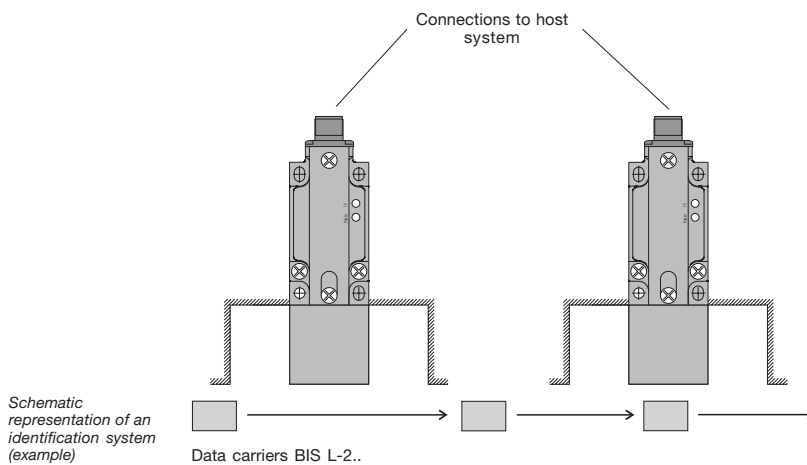
6

Introduction BIS L-400 Identification System

System components

The main components of the BIS L-400 identification system are

- the processor with integrated read head, and
- the data carrier(s).



7

BIS L-400 Processor Basic knowledge for the application

Data integrity with CRC_16

For applications which demand high security against incorrect data the CRC_16 procedure can be used. Here a check code is written to the data carrier which can be used at any time and anywhere to test for data integrity.

Advantages of CRC_16: Very high data integrity, even during the non-active phase (data carrier outside of r/w head capture zone)

Disadvantages of CRC_16: Some user data capacity is lost. The procedure is only compatible with BIS L-1_ _-05 data carriers which have been converted to read-only format.

Use of the CRC_16 check can be configured by the user (see ¶ 11).

8

Configuration

Before starting your programming, configure the processor unless you intend to use the factory default settings.

Configuration is done using a PC and the Balluff *Configuration Software BIS* program, and the parameters are stored in the processor. The configuration may be overwritten at any time and can be saved in a file for easy accessibility.

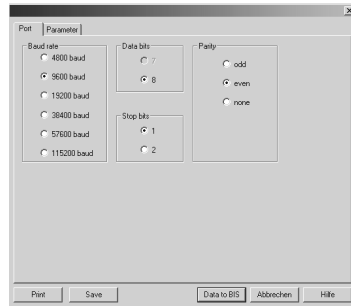


9

Configuration

Interface BIS L-400

In the first screen the transmission rate, number of data and stop bits as well as the parity type for the serial port are configured. The figure shows the factory default settings. Additional settings are made in the screens illustrated on the following [11].



Operation mode

The device can be operated in one of two modes: Terminal or Controller.

Terminal mode

Terminal mode is especially useful for simple representation of read data on the PC, for example using the Hyperterminal program included with the WINDOWS operating system. More detailed information on terminal mode can be found starting [12].

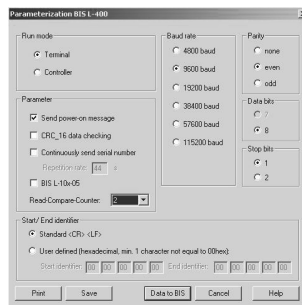
english BALLUFF 9

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Configuration

Controller mode

Controller mode is intended for controlling the processor using a PLC or host computer. This allows read data and the device status to be queried from the processor. Data integrity on the interface is ensured by sending of a block check (BCC). For additional information about controller mode, see [13].



Send power-on message

If this function is activated, the processor responds with the device name and software version as soon as power is turned on.

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Configuration

CRC_16 data check If this parameter is set, the data from the data carrier are sent along with a 2-byte CRC_16 check sum. This leaves only 3 bytes of user data remaining. If a correct CRC_16 check sum is recognized, it will be output in bytes 1 and 2. If a CRC error is detected, 00_{Hex}, 00_{Hex} is sent instead of the check sum. To use the CRC_16 procedure, the data carriers must first be initialized from the BIS L-60_ _ processor using the BISCOBRW.EXE PC software. The CRC_16 data check can only be carried out using type BIS L-10X-05/L data carriers.



The CRC_16 data check is only possible with model BIS L-10_-05/L data carriers.

BIS L-10_-05 If model BIS L-10_-05 data carriers are used, the "BIS L-10_-05" must be activated.

Data comparison counter Data integrity can be increased using the data compare counter, in which the processor reads out the data from the data carrier multiple times within a read cycle. The processor stores and compares the data. If the data carrier has been correctly recognized, the processor releases the data. From 1 to 10 reads can be set in the "Data compare counter" field. The default setting is 2, but when the specified installation conditions cannot be met this number may be increased to ensure data integrity.

Continuous sending of serial number If this function is activated, the serial number of the data carrier is constantly output as long as the CT Present signal is active. The function is only possible in terminal mode. In order to limit the amount of data on the interface a repetition rate (0..255s) can be entered. During this time the output is not refreshed if no new data carrier has been detected.

Start/end detection In terminal mode the default is for <CR> <LF> to be sent as an end detection. Alternately, in this mode you can send max. 5 characters as a start detection and max. 5 characters as end detection. The value 00_{Hex} is not allowed as a start or end detection. If in the configuration the processor recognizes the value 00_{Hex}, it interprets this as the termination for the desired start or end detection.

Protocol Sequence

Terminal mode When a data carrier enters the read zone of the processor, the data are immediately sent to the terminal. The time for detecting the data carrier is approx. 45 ms.

The data carrier data are displayed on the terminal screen. The terminal can only send the ASCII character 'SYN' (16 hex) to the processor to generate a software reset.

Example: Output 40 bits of data carrier data to the terminal

Data carrier data 2 1 A B C D E F 0 8 (hex)
0010 0001 1010 1011 1100 1101 1110 1111 0000 1000 (binary)

Sent characters: 21ABCDEF08_'FN''CR''LF'

i.e., 12 characters are sent:

- 1. - 10. characters Data carrier data (see above)
- 11. character Space <SP>
- 12. character Error number
- 13. character Carriage Return 0D (Hex)
- 14. character Line Feed 0A (Hex)

Error No. Hex	Error ASCII	Error Description	Cause
30	'0'	No Error	
45	'E'	CRC-Error	The CRC on the data carrier does not agree with the calculated CRC for the read data.

Protocol Sequence

Controller mode

A simple transmission protocol is used between the host controlling system and the processor. The following control characters are used:

ASCII Hex Meaning

'ENQ'	05	The processor informs the host system that an event has occurred. – Data carrier in front of the read head, data are ready.
'DLE'	10	The host system queries the current status or a current event. This is possible at any time.
'NAK'	15	Faulty or unrecognizable ASCII characters were received.
'STX'	02	Sent by the processor at the beginning of the data.
'ETX'	03	Sent at the end of the data.
BCC		The block check follows 'ETX' at the end of the data and represents the EXOR operation on the serially transmitted binary data from the data carrier and the error number, i.e., the data between 'STX' and 'ETX' (see example).
SYN		Software-Reset of the processor.

Protocol Sequence

Controller mode

Example: Output 40 bits of data carrier data to the host system

Data carrier data: 01hex 23hex 45hex 67hex 89hex

Sent characters: 'STX' 01234567890 'ETX' BCC

i.e., 12 characters are sent:

1. character	Start of Text	02 (Hex)
2. - 11. characters	Data carrier data	(see above)
12. character	Error number	(see ¶ 12)
13. character	End of Text	03 (Hex)
14. character	Block Check Character	(see below)

Block check formation:	ASCII	Hex	binary	
Data	0	30	0011 0000	EXOR
	1	31	0011 0001	EXOR
	2	32	0011 0010	EXOR
	3	33	0011 0011	EXOR
	4	34	0011 0100	EXOR
	5	35	0011 0101	EXOR
	6	36	0011 0110	EXOR
	7	37	0011 0111	EXOR
	8	38	0011 1000	EXOR
	9	39	0011 1001	EXOR
	0	30	0011 0000	EXOR
BCC	1	31	0011 0001	

Error Messages

Error numbers	Error No.		Error description	Cause
	Hex	ASCII		
	30	'0'	no error	
	31	'1'	No data carrier present	No data carrier in the active zone of the read/write head.
	45	'E'	CRC error	The CRC on the data carrier does not agree with the calculated CRC for the read data.

Timing Diagrams

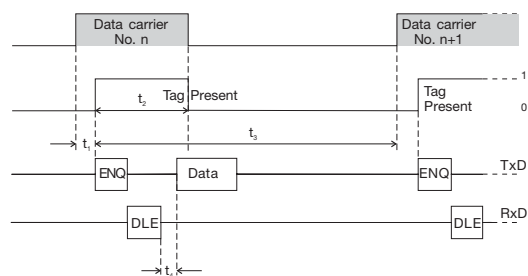
Reading the data without Reset

When a data carrier enters the read zone of the processor, the latter sends the ASCII character 'ENQ'. The data can only be requested by sending 'DLE'. The data can be requested until the next data carrier enters the read zone of the processor.

Data carrier is in read zone

Data are ready in the processor during Tag Present (checked multiple times).

Processor sends 'ENQ'. Controller replies with 'DLE'. Data are sent.



- $t_1 \leq 140$ ms: Read head gets data from data carrier and sends them to the processor.
- t_2 : Duration is determined by the presence of the data carrier in the read zone.
- t_3 : Data ready time: During this time the data must be retrieved.
- $t_4 \leq 1$ ms: Response time between 'DLE' and data transferred.

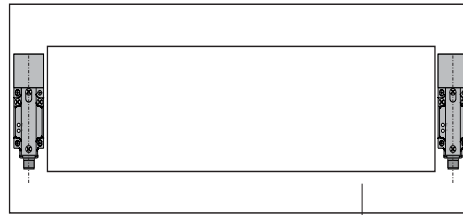
If the 'SYN' character is sent while the data carrier is in the read zone, the data are read again and output to the port. If there is no data carrier in the read zone, no data are output.

BIS L-400 Installation

Installation BIS L-400

When installing two BIS L-400 on a metal base, there is normally no mutual interference. If a metal frame is located in an unfavorable location, problems may result when reading out the data carriers. In this case the read distance will be reduced to 80 % of the maximum value.

Testing is recommended in critical applications!



Metal frame

Once a data carrier has been processed in front of a read head, the next data carrier must wait 400 ms before being introduced into the active field. This can be implemented by means of a stopper. If a stopper is not used, there is a rule of thumb which takes into account the conveyor speed. Distance between the data carriers in m = (0.4 x conveyor speed in m/s) + 0.25 m.

Example: Conveyor speed = 1 m/s

Distance = (0.4 x 1 m/s) + 0.25 m = 0.65 m

This is an approximation for the worst case.

When using small data carriers and/or small read heads, the distance is reduced considerably!

BIS L-400 Installation

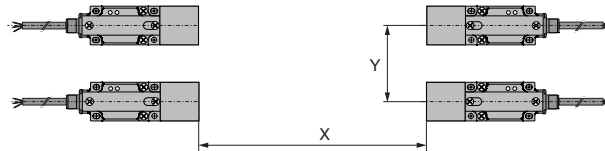
Installation BIS L-400, permissible distances

Distance from data carrier to data carrier

	BIS L-200-03/L BIS L-100-05/L	BIS L-201-03/L BIS L-101-05/L	BIS L-202-03/L BIS L-102-05/L
BIS L-400	> 25 cm	> 30 cm	> 40 cm

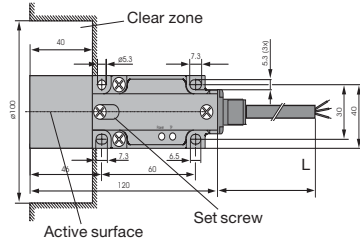
Distance from read head to read head

The following distances must be maintained between the individual BIS L-400 systems:



	Distance X	Distance Y
BIS L-405...-001-...	1 m	1 m
BIS L-405...-002-...	0.5 m	0.3 m
BIS L-405...-003-...	0.5 m	0.3 m
BIS L-405...-004-...	0.5 m	0.3 m

BIS L-400-035-001-__-S115 Installation



Characteristic data by data carrier

Characteristic data by data carrier (installed in clear zone)	at v = 0 (static condition)				
	Read distance (mm)	Center axis offset at a distance of: (mm)			
		0-25	0-35	0-45	0-15
BIS L-200-03 / L-100-05	0 - 30	± 15	-	-	-
BIS L-201-03 / L-101-05	0 - 40	-	± 20	-	-
BIS L-202-03 / L-102-05	0 - 55	-	-	± 30	-
BIS L-203-03 / L-103-05	0 - 20	-	-	-	± 10

Speeds (at standard setting data comparison counter = 2):

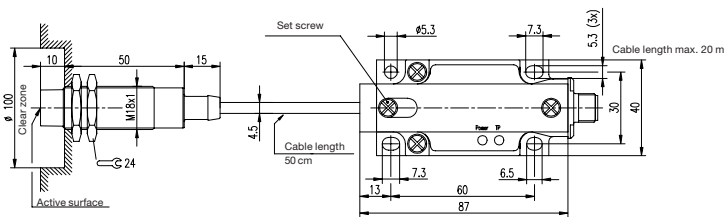
	at read distance [mm]	Speed [m/s]
BIS L-200-03	15	0.4
BIS L-201-03	20	0.45
BIS L-202-03	27.5	0.6
BIS L-203-03	10	0.28

Speeds (at "BIS L-10_-05" and "CRC data check"):

	at read distance [mm]	Speed [m/s]
BIS L-100-05	15	0.45
BIS L-101-05	20	0.5
BIS L-102-05	27.5	0.72
BIS L-103-05	10	0.36

Data carriers of type BIS L-10_-05 may only be used with the CRC_16 setting or with a serial number duplicated by a BIS L-20_-03 data carrier.

BIS L-400-035-002-__-S115 Installation



Characteristic data by data carrier

Characteristic data by data carrier (installed in clear zone)	at v = 0 (static condition)				
	Read distance (mm)	Center axis offset at a distance of: (mm)			
		0-10	0-15	0-20	0-25
BIS L-200-03 / L-100-05	0 - 23	± 12	± 12	± 8	-
BIS L-201-03 / L-101-05	0 - 27	± 15	± 15	± 15	± 6
BIS L-203-03 / L-103-05	0 - 16	± 8	± 4	-	-

Speeds (at standard setting data comparison counter = 2):

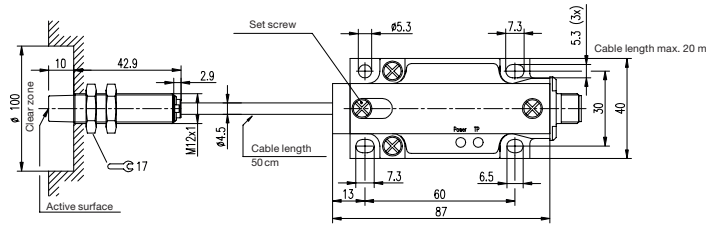
	at read distance [mm]	Speed [m/s]
BIS L-200-03	11.5	0.18
BIS L-201-03	13.5	0.22
BIS L-203-03	8	0.15

Speeds (at "BIS L-10_-05" and "CRC data check"):

	at read distance [mm]	Speed [m/s]
BIS L-100-05	11.5	0.22
BIS L-101-05	13.5	0.3
BIS L-103-05	8	0.18

Data carriers of type BIS L-10_-05 may only be used with the CRC_16 setting or with a serial number duplicated by a BIS L-20_-03 data carrier.

BIS L-400-035-003-__-S115 Installation



Characteristic data by data carrier

Characteristic data by data carrier (installed in clear zone)	at v = 0 (static condition)			
	Read distance (mm)	Center axis offset at a distance of: (mm)		
		0-5	0-8	0-11
BIS L-203-03 / L-103-05	0-11	± 6	± 4	± 2

Speeds (at standard setting data comparison counter = 2):

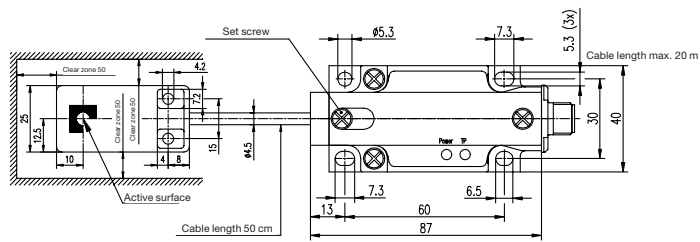
	at read distance [mm]	Speed [m/s]
BIS L-203-03	5.5	0.11

Speeds (at "BIS L-10_-05" and "CRC data check"):

	at read distance [mm]	Speed [m/s]
BIS L-103-05	5.5	0.14

Data carriers of type BIS L-10_-05 may only be used with the CRC_16 setting or with a serial number duplicated by a BIS L-20_-03 data carrier.

BIS L-400-035-004-__-S115 Installation



Characteristic data by data carrier

Characteristic data by data carrier (installed in clear zone)	at v = 0 (static condition)				
	Read distance (mm)	Center axis offset at a distance of: (mm)			
		0-10	0-15	0-20	0-25
BIS L-200-03 / L-100-05	0-23	± 12	± 12	± 8	-
BIS L-201-03 / L-101-05	0-27	± 15	± 15	± 15	± 6
BIS L-203-03 / L-103-05	0-16	± 8	± 4	-	-

Speeds (at standard setting data comparison counter = 2):

	at read distance [mm]	Speed [m/s]
BIS L-200-03	11.5	0.18
BIS L-201-03	13.5	0.22
BIS L-203-03	8	0.15

Speeds (at "BIS L-10_-05" and "CRC data check"):

	at read distance [mm]	Speed [m/s]
BIS L-100-05	11.5	0.22
BIS L-101-05	13.5	0.3
BIS L-103-05	8	0.18

Data carriers of type BIS L-10_-05 may only be used with the CRC_16 setting or with a serial number duplicated by a BIS L-20_-03 data carrier.

BIS L-400-035-001-_-S115 Reorienting and Rotating the Read Head

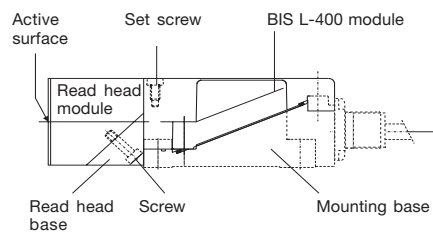
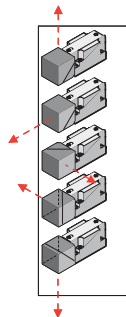
- Reorienting the read head**
- Remove the two screws on the read head base
 - Turn the read head module 180°
 - Tighten both screws

- Rotating the read head**
- Unscrew the set screw
 - Read head module can be rotated stepless (complete with read head base) to the desired position (range: 270°)
 - Tighten set screw
 - Read head module is secured against over-rotation



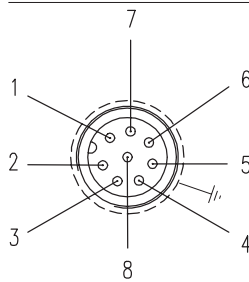
Read head modules are not interchangeable!

Active surface positions



BIS L-400-035-00 -_-S115 Installation

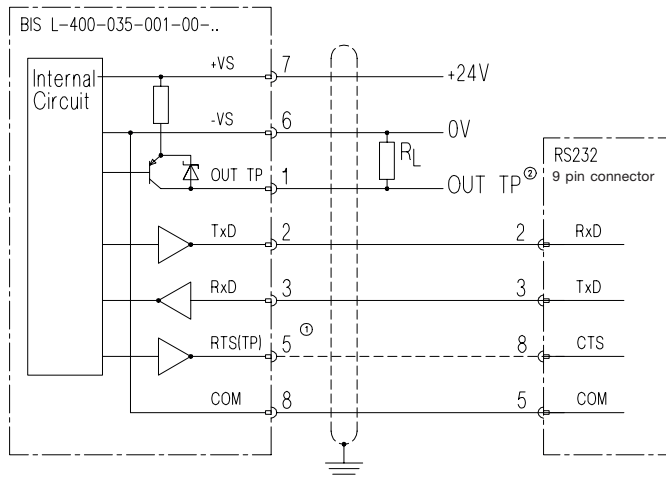
Pin assignments
BIS L-400-...



	RS232 = 00	RS422 = 02	Color code using cables BKS-S116-PU / -S115-PU
1	OUT TP	A (R+)	yellow
2	TxD	Y (T+)	gray
3	RxD	B (R-)	pink
4	NC	NC	red
5	RTS (TP)	Z (T-)	green
6	-VS	-VS	blue
7	+VS	+VS	brown
8	COM	COM	white

BIS L-400-035-00_00-S115
Interface Information

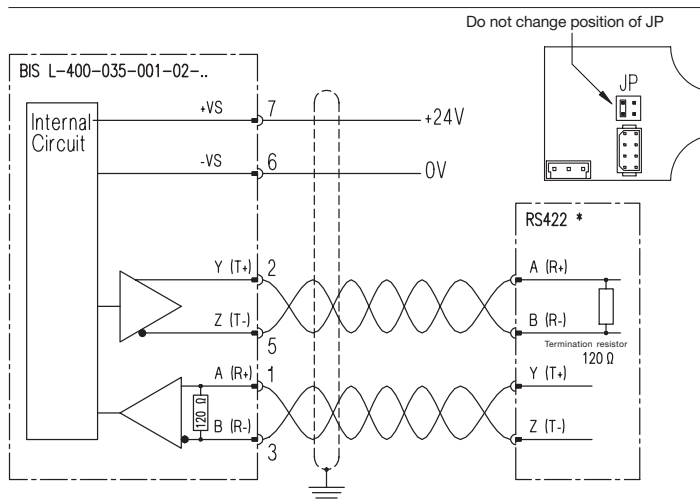
Interface
V.24 / RS232



- ① RTS connection (TP) allows TP display in the BISCOMRW.EXE program.
- ② OUT TP switches to +24V when there is a data carrier in the capture zone.

BIS L-400-035-00_02-S115
Interface Information

RS422
4-wire
point-to-point



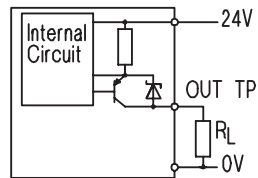
* Galvanic isolation is recommended for the supply voltage and RS422 interface!
Data line twisted pair.

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BIS L-400-035-00_-00-S115 Connection Diagrams

Wiring the outputs
OUT TP (only for
RS232)

PNP



Supply voltage: DC 24 V +10% / -20% (incl. ripple)
Output current: max. 200 mA
Voltage drop at 50 mA: ≤ 1.5 V

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BIS L-400 Technical Data

General data	Housing	Plastic (PBT)
Temperature range	Ambient temperature	0 °C to +60 °C
Enclosure rating	Enclosure rating	IP 67 (only when assembled)
Supply voltage	Supply voltage Current consumption	DC 24 V +10 % / -20 % (incl. ripple) ≤ 50 mA with no load
LED function indicator	Power Tag Present Overflow	LED green LED yellow LED yellow flashing (The "Tag Present" LED flashes rapidly if the data from a data carrier were not completely read and a new data carrier has arrived in the active zone.)



The CE Marking verifies that our products conform to the requirements of the EU Directive

2004/108/EC (EMC Directive)

and the EMC Law. In our EMC Laboratory, which is accredited by the DATech for Testing Electromagnetic Compatibility, we have verified that Balluff products meet the EMC requirements of the following Generic Standards:

EN 61000-6-4 (Emission), EN 61000-6-2 (Noise Immunity).

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BIS L-400 Ordering Information

Part Numbers

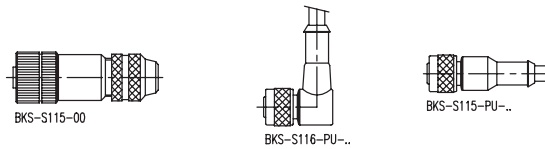
BIS L-400-035-00 -0 -S115

- Balluff Identification System _____
- Series L _____
- Hardware type _____
400 = Plastic housing
- Software type _____
035 = Serial
- Hardware type _____
001 = Coil Ø 34 mm
002 = discharged read head module M18 (0.5 m cable)
003 = discharged read head module M12 (0.5 m cable)
004 = discharged read head module C-305 housing (0.5 m cable)
- Interface _____
00 = RS232
02 = RS422/RS485 (4-wire, Point-to-Point)
- Module _____
S115 = M12 8-pole female

BIS L-400 Ordering Information

Accessories
(optional, not included in scope of delivery)

Type	Part No.
Mating connector without cable	BKS-S115-00
Cable (Pin assignments see ¶ 24)	BKS-S116-PU-...
Cable (Pin assignments see ¶ 24)	BKS-S115-PU-...



Cable is available in various standard lengths:
2 m, 5 m, 10 m, 15 m, 20 m, 25 m

Example: BKS-S115-PU-02 Part number for 2 m cable
BKS-S116-PU-15 Part number for 15 m cable



For BIS L-400-035-00_-00-S115 and a baud rate of 19.200 cable length max. 15 m
9.600 cable length max. 20 m.

Appendix, ASCII Table

Deci- mal	Hex	Control Code	ASCII	Deci- mal	Hex	Control Code	ASCII	Deci- mal	Hex	ASCII	Deci- mal	Hex	ASCII	Deci- mal	Hex	ASCII	Deci- mal	Hex	ASCII
0	00	Ctrl @	NUL	22	16	Ctrl V	SYN	44	2C	,	65	41	A	86	56	V	107	6B	k
1	01	Ctrl A	SOH	23	17	Ctrl W	ETB	45	2D	-	66	42	B	87	57	W	108	6C	l
2	02	Ctrl B	STX	24	18	Ctrl X	CAN	46	2E	.	67	43	C	88	58	X	109	6D	m
3	03	Ctrl C	ETX	25	19	Ctrl Y	EM	47	2F	/	68	44	D	89	59	Y	110	6E	n
4	04	Ctrl D	EOT	26	1A	Ctrl Z	SUB	48	30	0	69	45	E	90	5A	Z	111	6F	o
5	05	Ctrl E	ENQ	27	1B	Ctrl [	ESC	49	31	1	70	46	F	91	5B	[	112	70	p
6	06	Ctrl F	ACK	28	1C	Ctrl \	FS	50	32	2	71	47	G	92	5C	\	113	71	q
7	07	Ctrl G	BEL	29	1D	Ctrl]	GS	51	33	3	72	48	H	93	5D	]	114	72	r
8	08	Ctrl H	BS	30	1E	Ctrl ^	RS	52	34	4	73	49	I	94	5E	^	115	73	s
9	09	Ctrl I	HT	31	1F	Ctrl _	US	53	35	5	74	4A	J	95	5F	_	116	74	t
10	0A	Ctrl J	LF	32	20		SP	54	36	6	75	4B	K	96	60	`	117	75	u
11	0B	Ctrl K	VT	33	21		!	55	37	7	76	4C	L	97	61	a	118	76	v
12	0C	Ctrl L	FF	34	22		"	56	38	8	77	4D	M	98	62	b	119	77	w
13	0D	Ctrl M	CR	35	23		#	57	39	9	78	4E	N	99	63	c	120	78	x
14	0E	Ctrl N	SO	36	24		\$	58	3A	:	79	4F	O	100	64	d	121	79	y
15	0F	Ctrl O	SI	37	25		%	59	3B	;	80	50	P	101	65	e	122	7A	z
16	10	Ctrl P	DLE	38	26		&	60	3C	<	81	51	Q	102	66	f	123	7B	{
17	11	Ctrl Q	DC1	39	27		'	61	3D	=	82	52	R	103	67	g	124	7C	|
18	12	Ctrl R	DC2	40	28		(	62	3E	>	83	53	S	104	68	h	125	7D	}
19	13	Ctrl S	DC3	41	29		)	63	3F	?	84	54	T	105	69	i	126	7E	~
20	14	Ctrl T	DC4	42	2A		*	64	40	@	85	55	U	106	6A	j	127	7F	DEL
21	15	Ctrl U	NAK	43	2B		+												