7.2 DV1311.L08 and DV1311.L12

7.2.1 General information

The DV1311.L08 and DV1311.L12 modules let you control valve manifolds using multi-pin technology.

There are two types of valve control modules available for delivery, which use different connection types for the digital inputs.

Module	Connection type for digital inputs
DV1311.L08	16 x M8 with one channel per socket
DV1311.L12	8 x M12 with two channels per socket

Table 251: DV1311.Lxx - Connection types for digital inputs

- Controlling valve manifolds with multi-pin technology
- Up to 16 valves per valve manifold
- 16 digital inputs for feedback
- Separate feed for inputs and valve coils
- Configurable digital input filter
- All outputs with single channel diagnostics
- Extensive additional status information

7.2.2 Order data

DV1311.L08

DV1311.L12

Model number	Short description
	Digital valve control modules
X67DV1311.L08	X67 digital valve control module, 16 digital outputs, 24 VDC, 0.1 A, 1 x M16 connection, 16 digital inputs 24 VDC, sink, configurable input filter, M8 connection, high density module, LED status indicators
X67DV1311.L12	X67 digital valve control module, 16 digital outputs, 24 VDC, 0.1 A, 1 x M16 connection, 16 digital inputs 24 VDC, sink, configurable input filter, M12 connection, high density module, LED status indicators
	Required accessories
See 14 "Overview of pin connections" on page 647	

Table 252: DV1311.Lxx - Order data

7.2.3 Technical data

Product ID	DV1311.Lxx
Short description	
I/O module	16 digital outputs for controlling valve manifolds with multi-pin technology 16 digital inputs for feedback
Rated voltage	24 VDC
Digital inputs	
Input filter Hardware Software	 ≤100 µs Default 0 ms, can be configured between 0 and 25 ms in 0.2 ms intervals
Input circuit	Sink
Sensor supply	0.5 A total current
Digital outputs	
Rated output current	0.1 A
Total current	1.6 A
Output circuit	Source
Output protection	Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances, reverse polarity protection for output supply
General information	
Status indicators	I/O function for each channel, supply voltage, bus function
Diagnostics I/O supply Outputs	 Yes, with status LED and software status Yes, with status LED and software status
Electrical isolation Channel - Bus Channel - Channel	 Yes No
Power consumption X2X Link supply I/O internal	 0.75 W 1.3 W
Connection type X2X Link Outputs Module supply	 M12 (B-coded) M16 (19-pin) M8 (4-pin)
Connection type - Inputs X67DV1311.L08 X67DV1311.L12	 16 x M8 (3-pin) 8 x M12 (A-coded)
Certification Ex zone 2	CE, cRUus, GOST-R II 3G EEx nA II T5, IP67, Ta = 0 - 60°C

Table 253: DV1311.Lxx - Technical data

Product ID	DV1311.Lxx
Operational conditions	
Operating temperature	0 to +60°C
Mounting orientation	Any
Installation at altitudes above sea level 0 - 2000 m >2000 m	 No derating Reduction of ambient temperature by 0.5°C per 100 m
Protection type	IP67
Storage and transport conditions	
Temperature	-25 to +85°C
Mechanical characteristics	
Dimensions (W x H x D)	53 x 155 x 42 mm
Weight	320 g
Torque for connections M8 M12 M16	 Max. 0.4 Nm Max. 0.6 Nm Max. 1.0 Nm

Table 253: DV1311.Lxx - Technical data (Forts.)

7.2.4 Additional technical data

Product ID	DV1311.Lxx
Module supply	
Rated voltage	24 VDC
Voltage range	18 - 30 VDC
Integrated protection	Reverse polarity protection
Power consumption Sensor/actuator supply	 Max. 12 W [1)]
Actuator supply	
Voltage	Module supply minus voltage drop for short circuit protection
Voltage drop for short circuit protection at 500 mA	Max. 2 VDC
Total current	Max. 0.5 A
Short circuit protection	Yes
Digital inputs	
Input voltage	18 - 30 VDC
Input current at 24 VDC	Typ. 4.4 mA
Input resistance	Typ. 5 kΩ
Switching threshold Low High	 <5 VDC >15 VDC

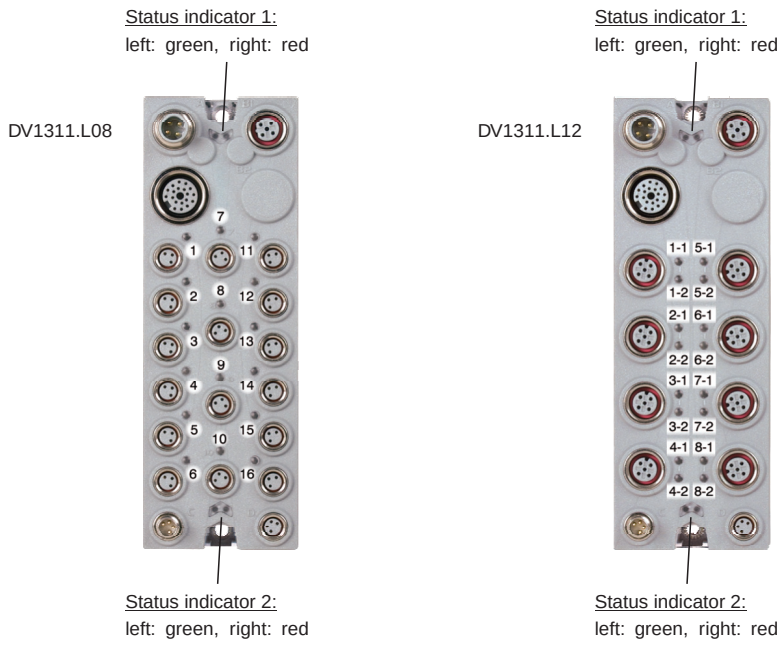
Table 254: DV1311.Lxx - Additional technical data

Product ID	DV1311.Lxx
Digital outputs	
Design	FET positive switching
Switching voltage	Module supply minus residual voltage
Diagnostics status	Output monitoring with 10 ms delay
Leakage current when switched off	5.0 µA
Residual voltage	<0.1 V @ 0.1 A rated current
Short circuit peak current	<2.0 A
Switching on after overload cutoff	Approx. 10 ms (depends on the module temperature)
Switching delay 0 → 1 1 → 0	 <100 µs <150 µs
Switching frequency Resistive load Inductive load	 Max. 100 Hz See the section 7.2.14 "Switching inductive loads" on page 346 (at 90% duty cycle)
Braking voltage when switching off inductive loads	52 VDC
General information	
Isolation voltage betw. channel and bus	500 V_{eff}
B&R ID code X67DV1311.L08 X67DV1311.L12	 $1AED $1AEE

Table 254: DV1311.Lxx - Additional technical data (Forts.)

1) The power consumption of the sensors and actuators connected to the module should not exceed 12 W.

7.2.5 Status LEDs



LED	Description		
Status indicator 1	Status indicator - X2X Link.		
	Green	**Red**	**Description**
	Off	Off	No supply via X2X Link
	On	Off	X2X Link supplied, communication is functioning
	Off	On	X2X supplied, but X2X communication is not functioning
	On	On	Preoperational: X2X Link supplied, module not initialized
1 - 16 or 1-1/2 to 8-1/2	Input state of the corresponding digital input The LEDs are green.		

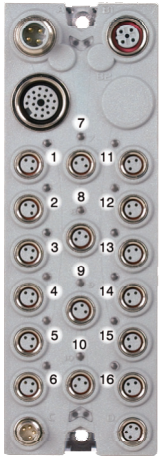
Table 255: DV1311.Lxx - Status LEDs

LED	Description		
Status indicator 2	Status indicator for module function.		
	LED	**Status**	**Description**
	Green	Off	Module supply not connected
		Single flash	Reset mode
		Blinking	Preoperational mode
		On	RUN mode
	Red	Off	Module supply not connected or everything is OK
		On	Error or reset state
		Single flash	Warning/error for an I/O channel. Level monitoring for digital outputs has been triggered.
		Double flash	Supply voltage not in the valid range

Table 255: DV1311.Lxx - Status LEDs (Forts.)

7.2.6 Connection elements

DV1311.L08



X2X Link, 2 x M12 (4-pin)
Plug A: input
Socket B1: output

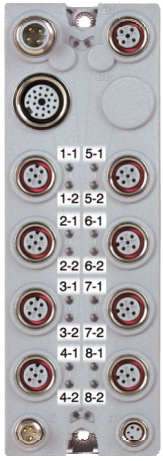
Valve manifold connection, 1 x M16 (19-pin)
16 digital outputs

Digital inputs
16 x M8 (3-pin)

24 VDC module supply, 2 x M8 (4-pin)
Plug C: feed
Socket D: routing

Figure 114: DV1311.L08 - Connection elements

DV1311.L12



X2X Link, 2 x M12 (4-pin)
Plug A: input
Socket B1: output

Valve manifold connection, 1 x M16 (19-pin)
16 digital outputs

Digital inputs
8 x M12 (5-pin)

24 VDC module supply, 2 x M8 (4-pin)
Plug C: feed
Socket D: routing

Figure 115: DV1311.L12 - Connection elements

Left side / Channels 1-8 in the first byte		Right side / Channels 9-16 in the second byte	
Channel	Socket	Socket	Channel
1	1-1	5-1	9
2	1-2	5-2	10
3	2-1	6-1	11
4	2-2	6-2	12
5	3-1	7-1	13
6	3-2	7-2	14
7	4-1	8-1	15
8	4-2	8-2	16

Table 256: DV1311.L12 - Socket and channel assignments

7.2.7 X2X Link

The DV1311.L08 and DV1311.L12 modules are connected to the X2X Link with pre-assembled cables. The connection is made using a circular plug (2 x M12, 4-pin).

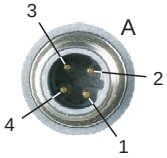
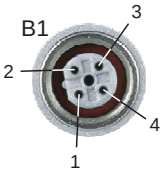
Connection	Pin assignments	
	**Pin**	**Name**
	1	X2X+
	2	X2X
	3	X2X⊥
	4	X2X\
	A ... B-coded plug in the module, input B1 ... B-coded socket in the module, output SHLD ... Shield connection made via threaded insert in the module	

Table 257: DV1311.Lxx - X2X Link

7.2.8 Digital outputs

The digital outputs are connected using pre-assembled cables with circular plugs (1 x M16, 19-pin).

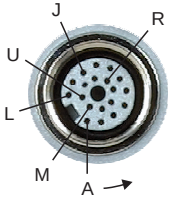
Connection	Pin assignments					
	**Pin**	**Name**	**Wire colors**	**Pin**	**Name**	**Wire colors**
	A	Output 1	White/gray	L	Output 11	Gray/brown
	B	Output 2	White/yellow	M	GND	Brown
	C	Output 3	Green	N	Output 12	Yellow
	D	Output 4	Red	O	Output 13	Gray
	E	Output 5	Gray/pink	P	Output 14	White/green
	F	Output 6	Pink	R	Output 15	White
	G	Output 7	Red/blue	S	Output 16	Purple
	H	Output 8	Black	T	NC	-
	J	Output 9	Brown/green	U	GND	Blue
	K	Output 10	Yellow/brown			

Table 258: DV1311.Lxx - Digital outputs

7.2.9 Digital inputs

DV1311.L08

The digital inputs are connected using pre-assembled cables with circular plugs (16 x M8, 3-pin).

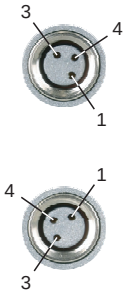
Connection	Pin assignments	
	**Pin**	**Name**
	1	24 VDC sensor supply [1]
	3	GND
	4	Input x
	1) Sensors should not be supplied externally.	

Table 259: DV1311.L08 - Digital inputs

DV1311.L12

The digital inputs are connected using pre-assembled cables with circular plugs (8 x M12, 5-pin).

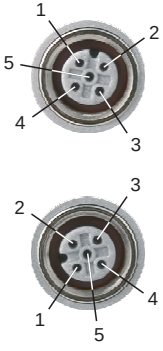
Connection	Pin assignments	
	**Pin**	**Name**
	1	24 VDC sensor supply [1]
	2	Input x-1
	3	GND
	4	Input x-2
	5	NC
	1) Sensors should not be supplied externally.	

Table 260: DV1311.L12 - Digital inputs

7.2.10 24 VDC module supply

The module supply connection is made using pre-assembled cables with circular plugs (2 x M8, 4-pin). The supply feed is connected via plug C. Socket D is used for routing the supply to other modules.

The maximum permitted current per supply is 4 A (sum 8 A).

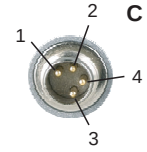
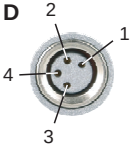
Connection	Pin assignments	
	**Pin**	**Name**
	1	24 VDC input supply [1)]
	2	24 VDC output supply [1)]
	3	GND
	4	GND
	C ... Plug on the module, supply feed D ... Socket on the module, supply routing 1) The output supply can be shut off without shutting off the supply to the inputs since the supply voltage is split. In order to achieve category 4 shutdown according to EN 954-1, the entire module supply (feed via 2 pins) must be safely shutdown.	

Table 261: DV1311.Lxx - 24 VDC module supply

7.2.11 Input/output circuit diagram

DV1311.L08

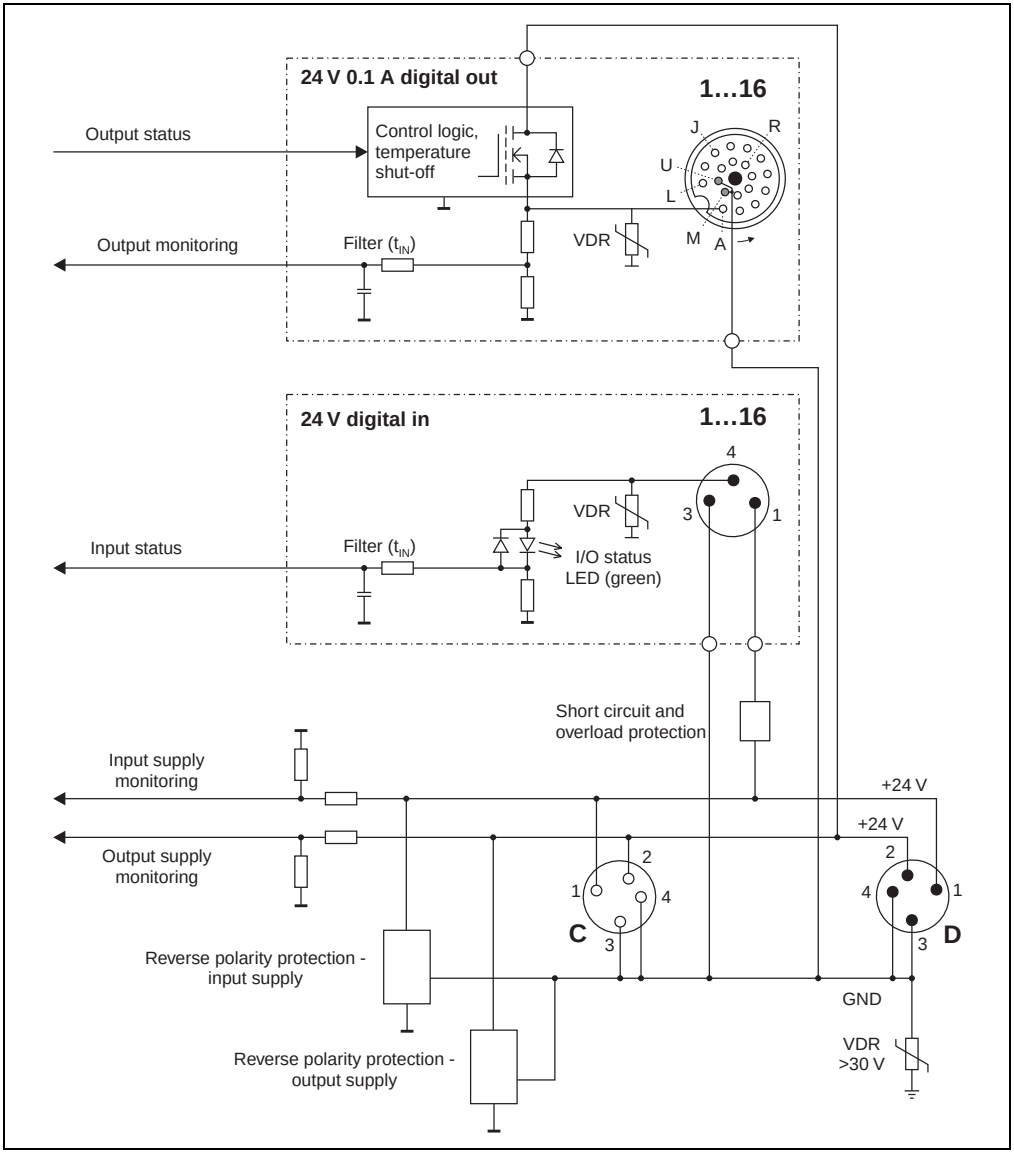


Figure 116: DV1311.L08 - Input/output circuit diagram

DV1311.L12

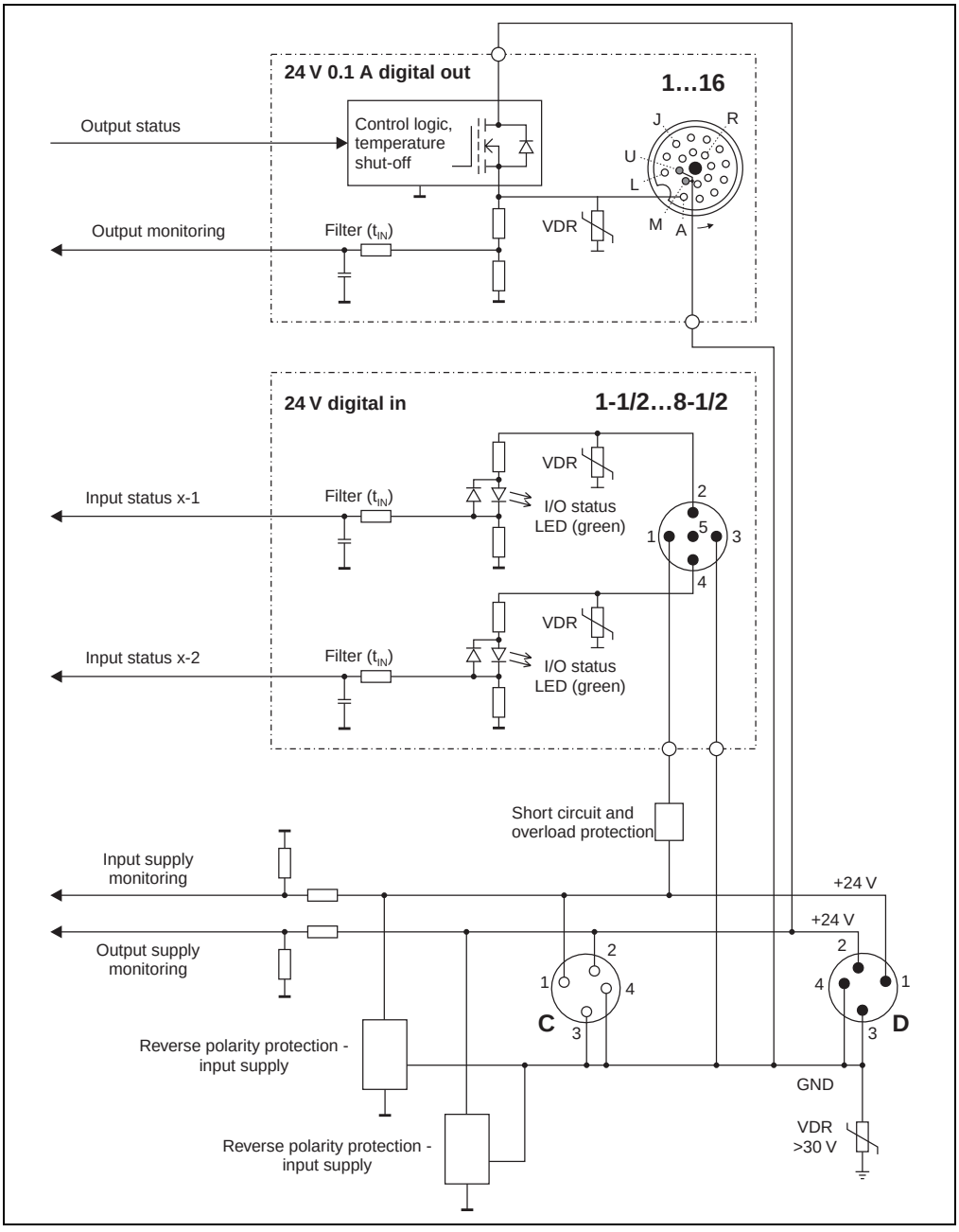


Figure 117: DV1311.L12 - Input/output circuit diagram

7.2.12 Monitoring the module supply

The supply voltage for the inputs-/outputs is monitored separately. The status and the current voltage value can be read.

7.2.13 Output monitoring

The output states are compared to the set values on the module. The control for the output driver is used for the set states. The status of each individual channel can be read.

7.2.14 Switching inductive loads

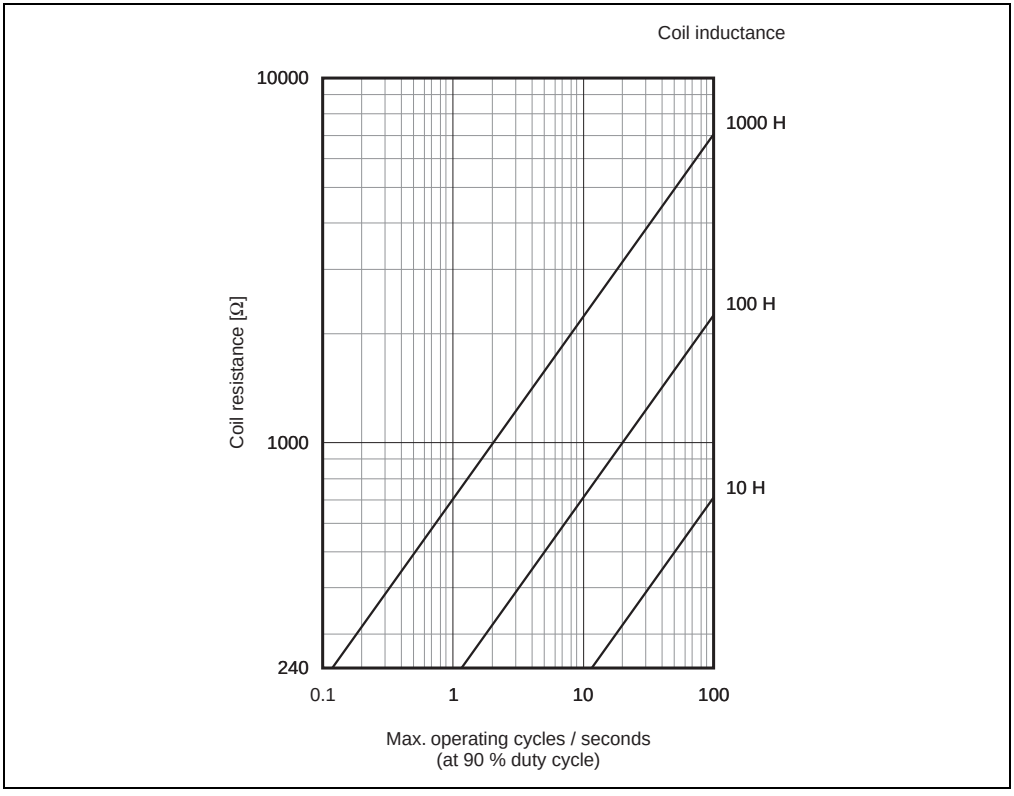


Figure 118: DV1311.Lxx - Switching inductive loads

7.2.15 Module addressing

Modules are addressed automatically. No settings are required on the module.

7.2.16 Register

The registers are divided in cyclic and acyclic registers.

Register type	Register ID
Cyclic	Bank 0
Acyclic	Bank 32

Table 262: DV1311.Lxx - Register ID

The following table contains the registers supported by the module:

Register	Description	Configuration					
		Data type	Length	Read	Write	Cyclic	Acyclic
Bank 0							
0	Digital inputs 1 - 8	USINT	1	●		●	●
1	Digital inputs 9 - 16	USINT	1	●		●	●
2	Digital outputs 1 - 8	USINT	1		●	●	●
3	Digital outputs 9 - 16	USINT	1		●	●	●
18	Input filter	USINT	1		●	●	●
30	Status of outputs 1 - 8	USINT	1	●		●	●
31	Status of outputs 9 - 16	USINT	1	●		●	●
Bank 32							
0	B&R ID code	UINT	1	●			●
4	Status - Operating limits	USINT	1	●			●
16	Current input supply voltage	USINT	1	●			●
18	Current output supply voltage	USINT	1	●			●

Table 263: DV1311.Lxx - Register overview

7.2.17 Cyclic register (bank 0)

Digital inputs

Unfiltered

The input status is registered with a fixed offset with respect to the network cycle and is transferred in the same cycle.

Filtered

The filtered status is registered with a fixed offset with respect to the network cycle and is transferred in the same cycle. Filtering takes place asynchronous to the network in a 200 µs grid with a network-related jitter of up to 50 µs.

Digital outputs

The output status is transferred to the output channels using a fixed offset to the network cycle.

Input filter

Filtering for all digital inputs can be configured using this register.

Value	Filter
0	No SW filter
2	0.2 ms
4	0.4 ms
:	:
250	25 ms - higher values are limited to this value

Table 264: DV1311.Lxx - Input filter

Status of the outputs

The output states for the outputs are compared to the set values on the module. The control for the output driver is used for the set states.

A change in the output status resets the monitoring for this output. The status of each individual channel can be read. A change in the monitoring status generates an error message.

Channels 1 - 8

Bit	Description
0	0 ... Channel 1: No error 1 ... Channel 1: Short circuit or overload
1	0 ... Channel 2: No error 1 ... Channel 2: Short circuit or overload
2	0 ... Channel 3: No error 1 ... Channel 3: Short circuit or overload
3	0 ... Channel 4: No error 1 ... Channel 4: Short circuit or overload
4	0 ... Channel 5: No error 1 ... Channel 5: Short circuit or overload
5	0 ... Channel 6: No error 1 ... Channel 6: Short circuit or overload
6	0 ... Channel 7: No error 1 ... Channel 7: Short circuit or overload
7	0 ... Channel 8: No error 1 ... Channel 8: Short circuit or overload

Channels 9 - 16

Bit	Description
0	0 ... Channel 9: No error 1 ... Channel 9: Short circuit or overload
1	0 ... Channel 10: No error 1 ... Channel 10: Short circuit or overload
2	0 ... Channel 11: No error 1 ... Channel 11: Short circuit or overload
3	0 ... Channel 12: No error 1 ... Channel 12: Short circuit or overload
4	0 ... Channel 13: No error 1 ... Channel 13: Short circuit or overload
5	0 ... Channel 14: No error 1 ... Channel 14: Short circuit or overload
6	0 ... Channel 15: No error 1 ... Channel 15: Short circuit or overload
7	0 ... Channel 16: No error 1 ... Channel 16: Short circuit or overload

7.2.18 Acyclic register (bank 32)

B&R ID code

Code for module identification:

- DV1311.L08:$1AED
- DV1311.L12:$1AEE

Status register operating limits

Bit	Description
0	0 ... Input supply within the warning limits (18 - 30 V) 1 ... Input supply outside the warning limits (<18 V or >30 V)
1	0
2	0 ... Output supply within the warning limits (18 - 30 V) 1 ... Output supply outside the warning limits (<18 V or >30 V)
3 - 7	0

Monitoring the module supply

The supply voltage for the inputs-/outputs is measured separately. Resolution: 1 V

7.2.19 Function models

A function model describes the registers for the module (memory model) which are available for the application. Only these registers are processed on the module during each cycle and cyclically transferred using the bus. The cycle time can be minimized by selecting the correct function model.

Minimum cycle time

The minimum cycle time is the minimum time needed for the bus cycle to be shut down without a communication error or malfunction occurring. It should be noted that very fast cycles reduce the idle time needed for handling monitoring, diagnostics and acyclic commands.

Minimum I/O update time

The minimum I/O update time refers to the minimum time it takes for the bus cycle to shut down, so that in each cycle an I/O update takes place.

Digital module - Function model (default)

Function model 0					
Register	Description	Configuration			
		Data type	Length	Read	Write
0	Digital inputs 1 - 8	USINT	1	●	
1	Digital inputs 9 - 16	USINT	1	●	
2	Digital outputs 1 - 8	USINT	1		●
3	Digital outputs 9 - 16	USINT	1		●
18	Input filter	USINT	1		●
30	Status of outputs 1 - 8	USINT	1	●	
31	Status of outputs 9 - 16	USINT	1	●	

Table 265: DV1311.Lxx - Digital module - Function model 0

Minimum cycle time	
Without filtering	150 µs
With filtering	200 µs

Table 266: DV1311.Lxx - Minimum cycle time for function model 0

Minimum I/O update time	
Without filtering	150 µs
With filtering	200 µs

Table 267: DV1311.Lxx - Minimum I/O update time for function model 0