

Operation Manual

IO-Link Modules

NC-HA-8A5F-12AAA/AL2904

NC-HB-8A5F-12A0A/AL2903





Before starting work read these instructions.

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Contents

1 Preliminary note	3
2 Safety instructions	3
3 Functions and features	3
3.1 IO-Link	3
3.1.1 General information	3
3.1.2 Device-specific information	3
3.1.3 Response when the IO-Link communication is interrupted	3
4 Function	4
4.1 Electrical isolation of the voltage supply	4
4.2 Visual indication	4
4.3 Parameter setting	4
4.4 Inputs/outputs	4
4.5 Voltage supply	4
4.5.1 Response in case of undervoltage	4
4.5.2 UAi sensor supply	4
4.5.3 Limit values, overcurrent protection	4
4.6 Digital input filters	5
4.6.1 Debounce	5
4.6.2 Hold	5
4.6.3 Inverting	6
4.6.4 Combination of different input filters	6
5 Installation	7
6 Electrical connection	7
6.1 IO-Link connection	7
6.2 Input circuit	7
6.3 Pin connection	8
7 Operating and display elements	8
7.1 NC-HB-8A5F-12A0A/AL2903	8
7.2 NC-HA-8A5F-12AAA/AL2904	9
7.3 LEDs	10
8 Scale drawing	11
8.1 NC-HB-8A5F-12A0A/AL2903	11
8.2 NC-HA-8A5F-12AAA/AL2904	12
9 Technical data	13
10 Maintenance, repair and disposal	13
10.1 Cleaning the housing surface	13
11 Approvals/standards	13

1. Preliminary note

- Instruction
- > Reaction, result Important note
-  Non-compliance may result in malfunction or interference.
-  Information Supplementary note

2. Safety instructions

- Please read the operating instructions prior to set-up of the device. Ensure that the product is suitable for your application without any restrictions.
- The unit complies with the relevant regulations and EU directives.
- Improper or non-intended use may lead to malfunctions of the unit or to unwanted effects in your application.
- Installation, electrical connection, set-up, operation and maintenance of the unit must be carried out by qualified personnel authorised by the machine operator.

3. Functions and features

The unit has 8 configurable ports, which can each be used as digital input or digital output.

The unit has a grey housing and is suitable for use in the food and beverage industry in areas where the use of cleaning agents at high pressure and high temperatures are common.

3.1. IO-Link

3.1.1. General information

This unit has an IO-Link communication interface which enables direct access to process and diagnostic data. In addition it is possible to set the parameters of the unit while it is in operation. Operation of the unit via an IO-Link interface requires an IO-Link capable module (IO-Link master).

3.1.2. Device-specific information

With a PC, suitable IO-Link software and an IO-Link adapter cable, communication is possible while the system is not in operation. The IODDs necessary for the configuration of the unit, detailed information about process data structure, diagnostic information, parameter addresses and the necessary information about the required IO-Link hardware and software can be found at www.norgren.com.

3.1.3. Response when the IO-Link communication is interrupted

The parameter "Output state COM lost / PD invalid" (index 15000) is used to set how the outputs are to respond when the IO-Link communication is interrupted. For every output it can be defined separately if it:

- is to be switched on (HIGH)
- is to be switched off (LOW)
- or is to keep the last state

4. Function

After power on, the unit is in the RUN mode (normal operating mode).

4.1. Electrical isolation of the voltage supply

The voltage supply of the ports (UA and UA_i) is electrically isolated from the voltage supply of the IO-Link master (US).



An electrical connection between US and UA_i eliminates the electrical isolation. This can lead to increased interference in the IO-Link communication.

4.2. Visual indication

The unit signals

- the current physical state of the inputs/outputs (yellow LED I/O1 and I/O2)
- error-free operation (green LEDs US, UA and UA_i light, red LEDs INT, 1 and 2 are off)
- a short circuit of min. one sensor supply
 - of port group 1 (X1.0 ... X1.3 --> LEDs I/O 1 flash, red LED 1 on)
 - of port group 2 (X1.4 ... X1.7 --> LEDs I/O 2 flash, red LED 2 on)
- an internal fault (red LED INT on)

4.3. Parameter setting

Device-specific parameter lists for IO-Link parameter setting are available at www.norgren.com.

4.4. Inputs/outputs

The unit has 8 ports (X1.0...X1.7). Each port has 2 digital inputs/outputs.

4.5. Voltage supply

4.5.1. Response in case of undervoltage

If the voltage supply of the outputs (UA) for one port group falls below 16 V, all outputs of this port group switch off.

4.5.2. UA_i sensor supply

The unit has 8 sensor supplies. All sensor supplies feature common short-circuit monitoring. The output voltage of the sensor supplies is proportional to the operating voltage which can vary within the IO-Link specification (18 ... 30 V DC).

4.5.3. Limit values, overcurrent protection

	NC-HB-8A5F-12A0A/AL2903	NC-HA-8A5F-12AAA/AL2904
Total current	1 A	3.6 A
Sensor supply (pin1)	Max. 1 A	400 mA
Max. total current per port group	1 A	1.8 A
Max. current per port	1 A	1.8 A

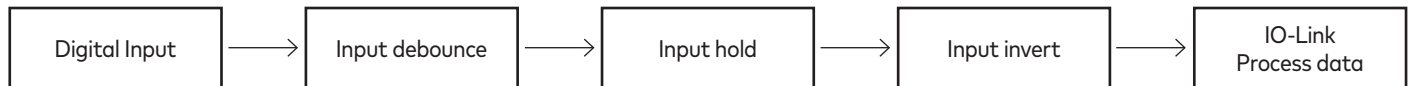
For NC-HB-8A5F-12A0A/AL2903, the total current is limited to 1 A. The current per port is limited to 1 A. If the total current is too high, the unit will switch off the ports until the current is once again within the permissible range.

For NC-HA-8A5F-12AAA/AL2904, the total current is limited to 3.6 A. The current per port is limited to 1.8 A. If the total current of a port group is too high, the unit will switch off the overloaded port group until the current is once again within the permissible range.

4.6. Digital input filters

The input signals can be changed via different filters before they are passed on via IO-Link. The following filters are available and are applied to the input signal in this order:

1. Debounce
2. Hold
3. Inverting



Each of these filters can be configured separately via IO-Link.

More information is available in the IODD at www.norgren.com.

The unit detects signals of a length of min. 2 ms. Shorter signals are not detected.

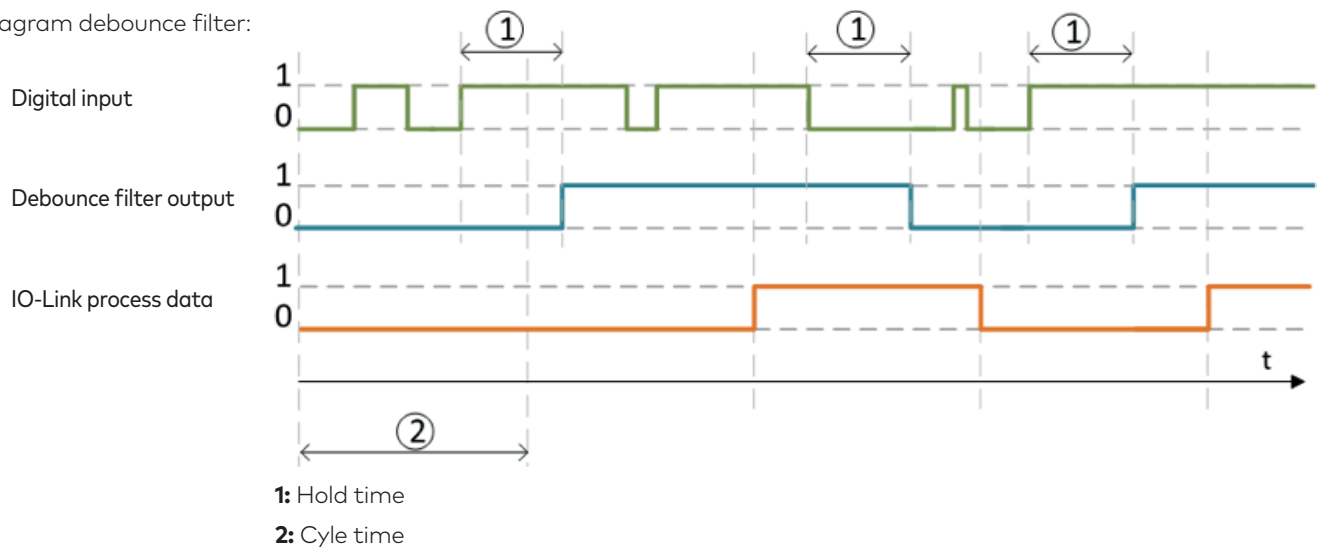


Periodic signals are only detected reliably if the signal period is at least twice as long as the cycle time.

4.6.1. Debounce

The input debouncing filter suppresses noise signals caused by mechanical switches. The filter switches the input signals to the filter output with a delay (debounce time). All signals shorter than the set debounce time are ignored by the filter.

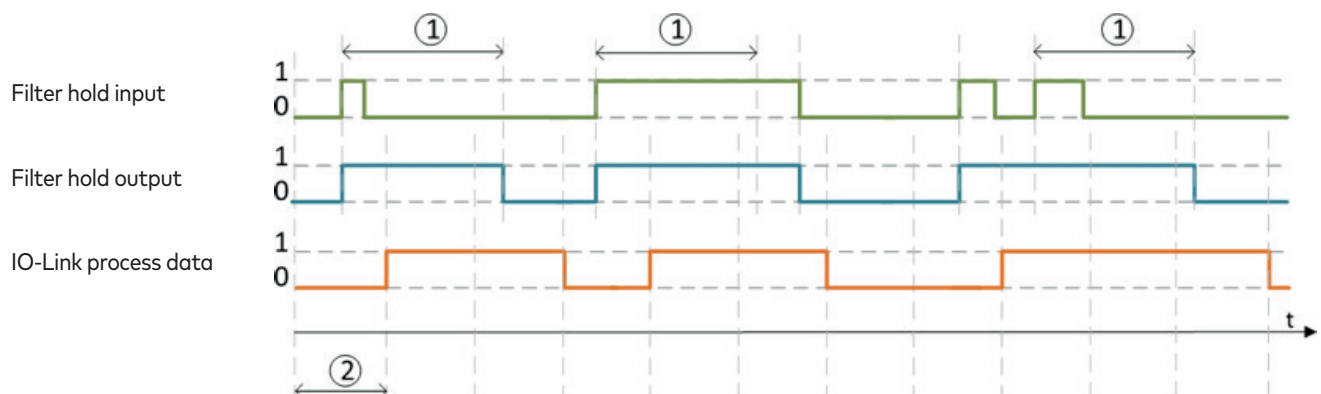
Time diagram debounce filter:



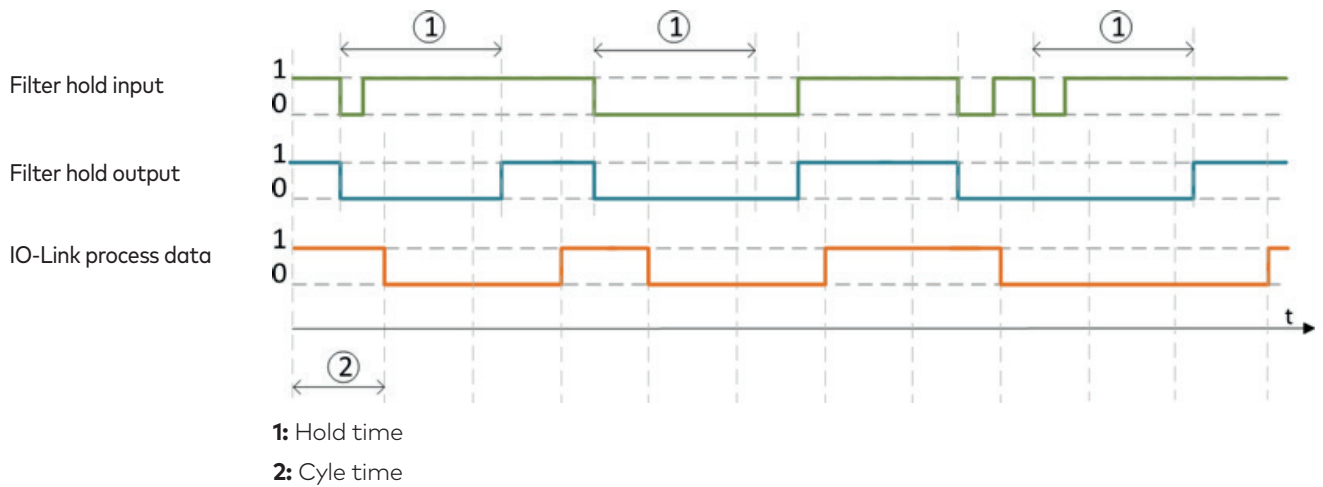
4.6.2. Hold

This filter prolongs short input pulses. Via the following parameters the filter is configured:

- Hold time: Pulse duration to which short pulses are to be prolonged. Pulses that are present for a longer time than the hold time are not prolonged.
- Hold status: Input level to be prolonged (HIGH or LOW) Time diagram filter hold with hold status HIGH:



Time diagram filter hold with hold status LOW:



Input signals shorter than the cycle time are not reliably transmitted. To ensure a correct signal transmission via IO-Link the filter hold must be used.

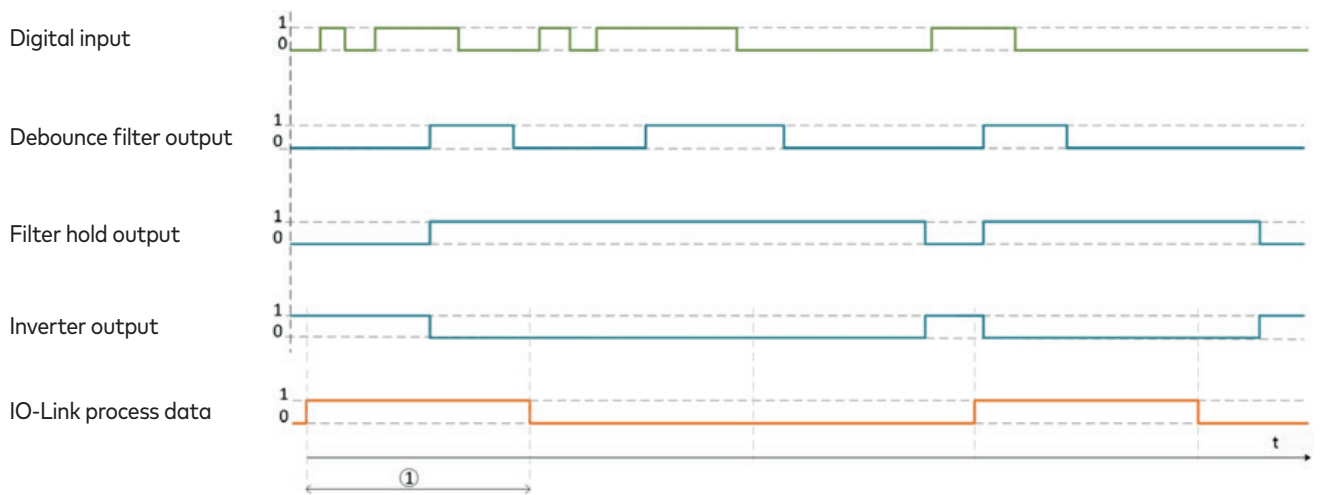
4.6.3. Inverting

This filter inverts incoming input signals.

4.6.4. Combination of different input filters

The different input filters can be combined.

In the following example all 3 filters are used:



5. Installation



► Disconnect power before installation.



► For installation choose a flat mounting surface.

- Fasten the module onto the mounting surface using M5 screws and washers. Tightening torque 1.8 Nm.
- Connect the plugs of the sensors to the M12 sockets. Tightening torque max. 1 Nm.
- Cover the unused sockets with suitable protective caps. Tightening torque 0.6...0.8 Nm.



Observe the maximum tightening torque of the connection cable.

6. Electrical connection



The unit must be connected by a qualified electrician.

The national and international regulations for the installation of electrical equipment must be adhered to.

Voltage supply according to SELV, PELV

- Disconnect power.
- Connect the unit.



Do not connect more than 30 m of cable to the outputs.



Maximum cable length for IO-Link communication: 20 m



Do not apply external voltage to the outputs.

6.1. IO-Link connection

The IO-Link port must be connected according to the IO-Link specification. The current required by the units depends on the current load of the sensor supplies.

6.2. Input circuit

The unit has digital type 3 inputs. Connected units must be suitable for these inputs.



Maximum cable length: 20 m

6.3. Pin connection

M12 connector, A-coded IO-Link (X1)

- 1: + 24 V DC (US)
- 2: Not connected
- 3: GND (US)
- 4: IO-Link



AL2x25:

M12 connector, A-coded Voltage supply U_{AUX} (X31)

- 1: + 24 V DC (U_{Ai})
- 2: GND (U_A and U_{Ai})
- 3: Not connected
- 4: + 24 V DC (U_A)



M12 connector, A-coded Ports (X1.0...X1.7)

- 1: + 24 V DC (U_A and U_{Ai})
- 2: Input/output I/O2
- 3: GND (U_A and U_{Ai})
- 4: Input/output I/O1
- 5: Not connected

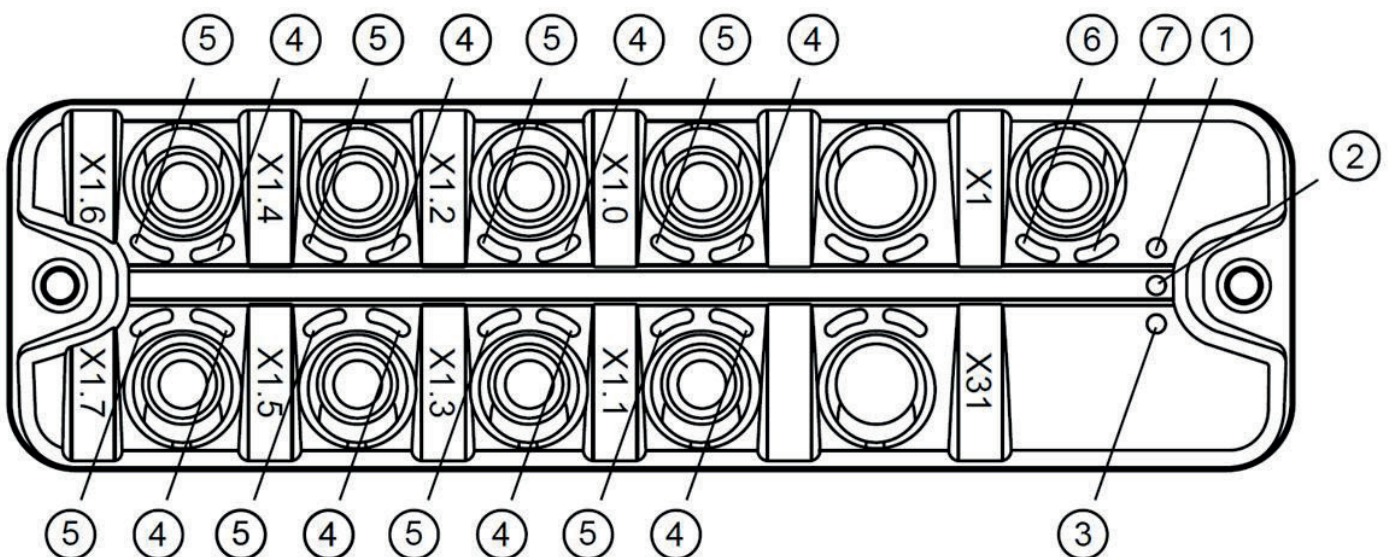


7. Operating and display elements

7.1. NC-HB-8A5F-12A0A/AL2903

NC-HB-8A5F-12A0A/AL2903

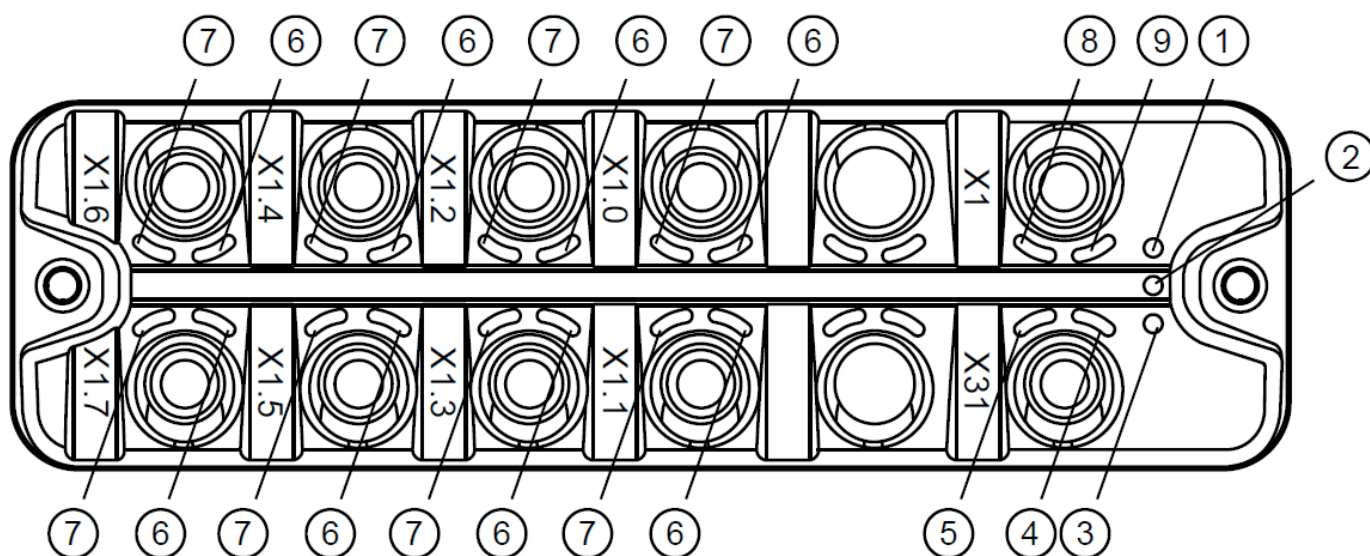
- | | |
|-------------|----------------------------|
| 1: LED INT | Internal error |
| 2: LED 1 | Error port group 1 |
| 3: LED 2 | Error port group 2 |
| 4: LED I/O2 | Status input / output I/O2 |
| 5: LED I/O1 | Status input / output |
| 6: LED | I/O1 IO-Link communication |
| 7: LED US | Supply voltage |




7.2. NC-HA-8A5F-12AAA/AL2904

NC-HA-8A5F-12AAA/AL2904

1: LED INT	Internal error
2: LED 1	Error port group 1
3: LED 2	Error port group 2
4: LED UA	Supply voltage ports
5: LED UA _i	Supply voltage sensors
6: LED I/O2	Status input/output I/O2
7: LED I/O1	Status input/output I/O1
8: LED	IO-Link communication
9: LED US	Supply voltage

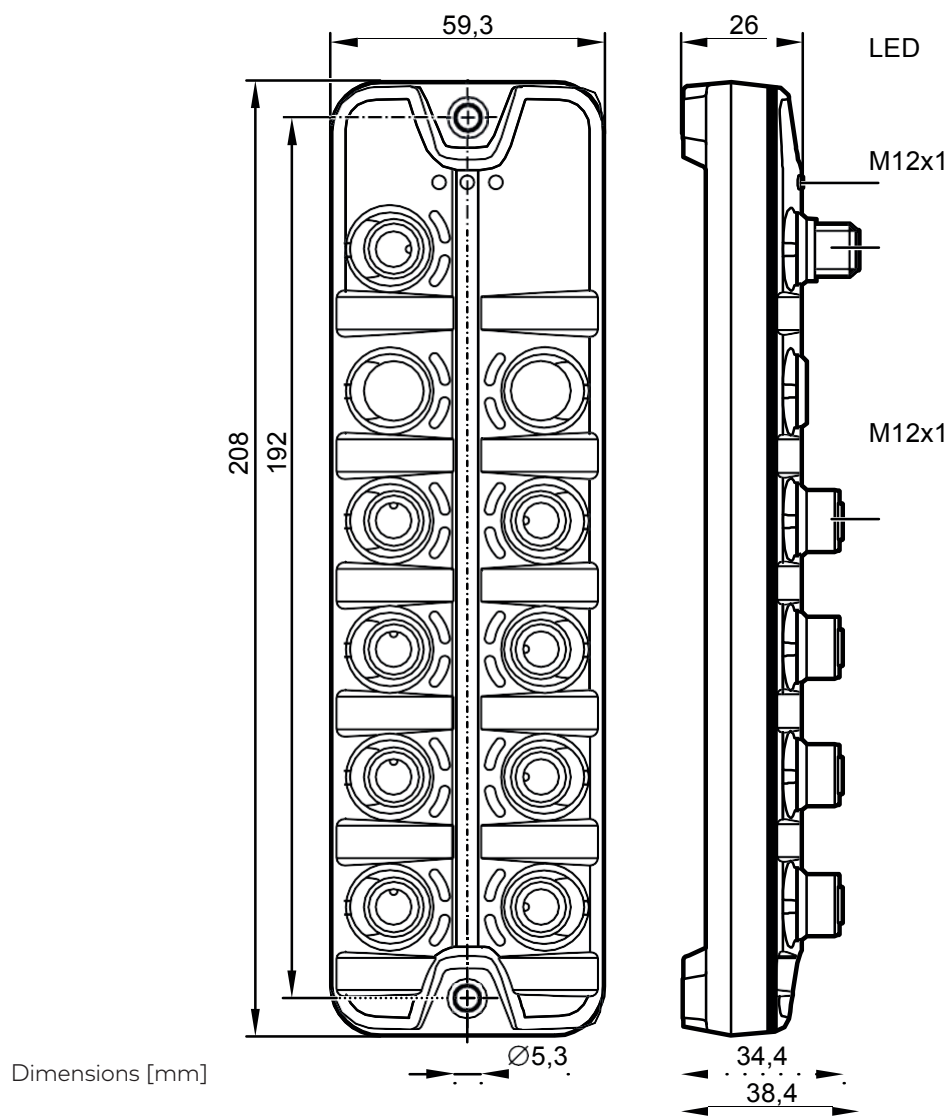


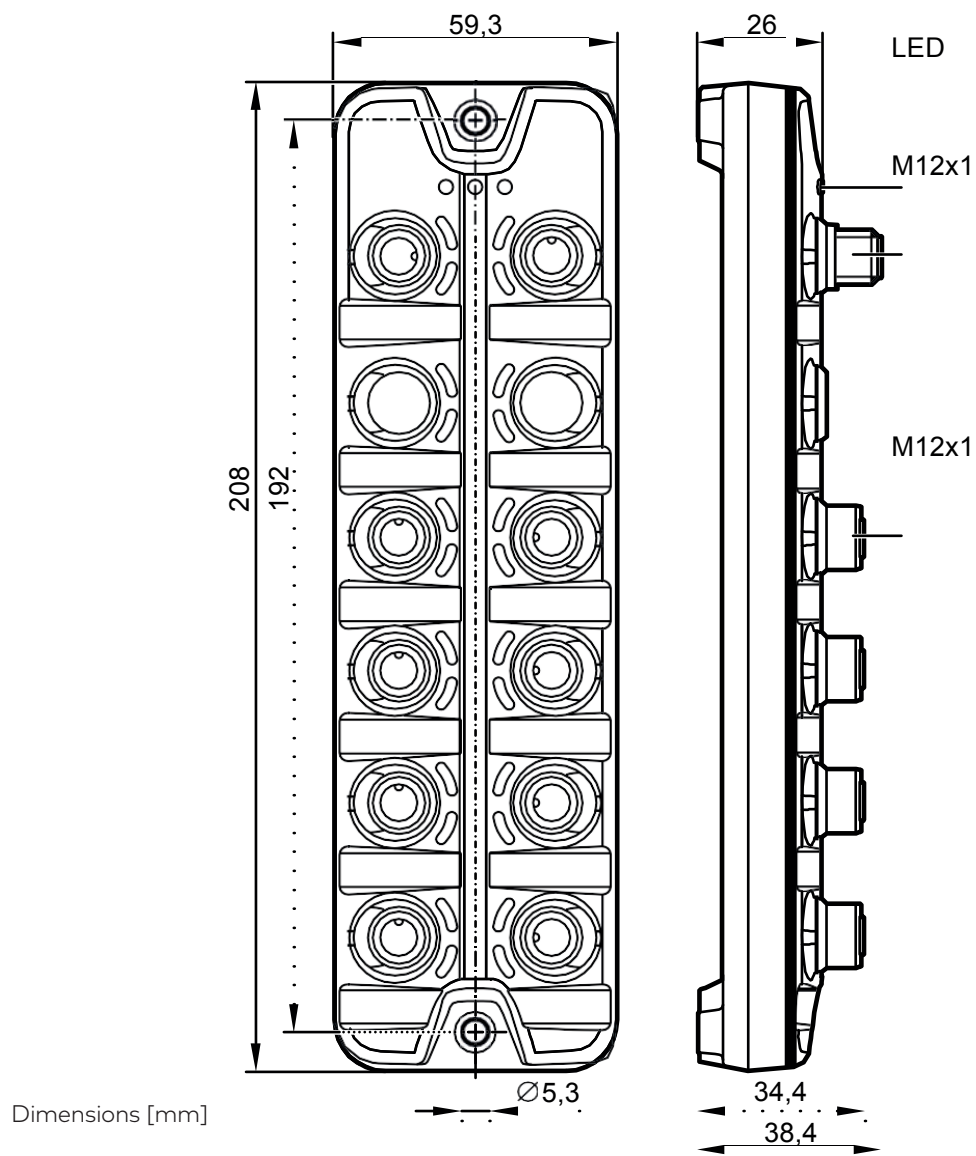
7.3. LEDs

LED	Colour	Mode	Status	Description
INT	red		on	internal error
			off	no internal error unit in the operating mode
1	red		on	short circuit in port group 1
			off	no error in port group 1 unit in the operating mode
2	red		on	short circuit in port group 2
			off	no error in port group 2 unit in the operating mode
US	green		on	voltage supply $\geq 18\text{ V}$
			off	voltage supply $< 16\text{ V}$
UA (NC-HA-8A5F-12AAA/AL2904 only)	green		on	voltage supply $\geq 18\text{ V}$
			off	voltage supply $< 16\text{ V}$
UAI (NC-HA-8A5F-12AAA/AL2904 only)	green		on	voltage supply $\geq 18\text{ V}$
			off	voltage supply $< 16\text{ V}$
	green		on	IO-Link communication active
			off	IO-Link communication not active
I/O1, I/O2	yellow	DI	on	input signal high
			off	input signal low
			flashing	short circuit
		DO	on	input signal high
			off	input signal low
			flashing	short circuit

8. Scale drawing

8.1. NC-HB-8A5F-12A0A/AL2903



8.2. NC-HA-8A5F-12AAA/AL2904


9. Technical data

Technical data and further information at www.norgren.com

10. Maintenance, repair and disposal

The operation of the unit is maintenance-free.

Dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations when it is no longer used.

10. Maintenance, repair and disposal

- ▶ Disconnect the device.
- ▶ Clean the device from dirt using a soft, chemically untreated and dry cloth.
- ▶ In case of severe soiling, use a damp cloth.



Micro-fibre cloths without chemical additives are recommended.

11. Approvals/standards

EU declarations of conformity, approvals etc. can be downloaded at: www.norgren.com

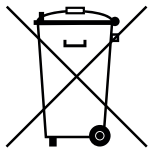
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Disposal of this product is regulated by the EU WEEE Directive for waste electrical and electronic equipment. Dispose of the product properly and not as part of the normal waste stream.

Observe the regulations of the respective country. Information can be obtained from the national authorities.



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