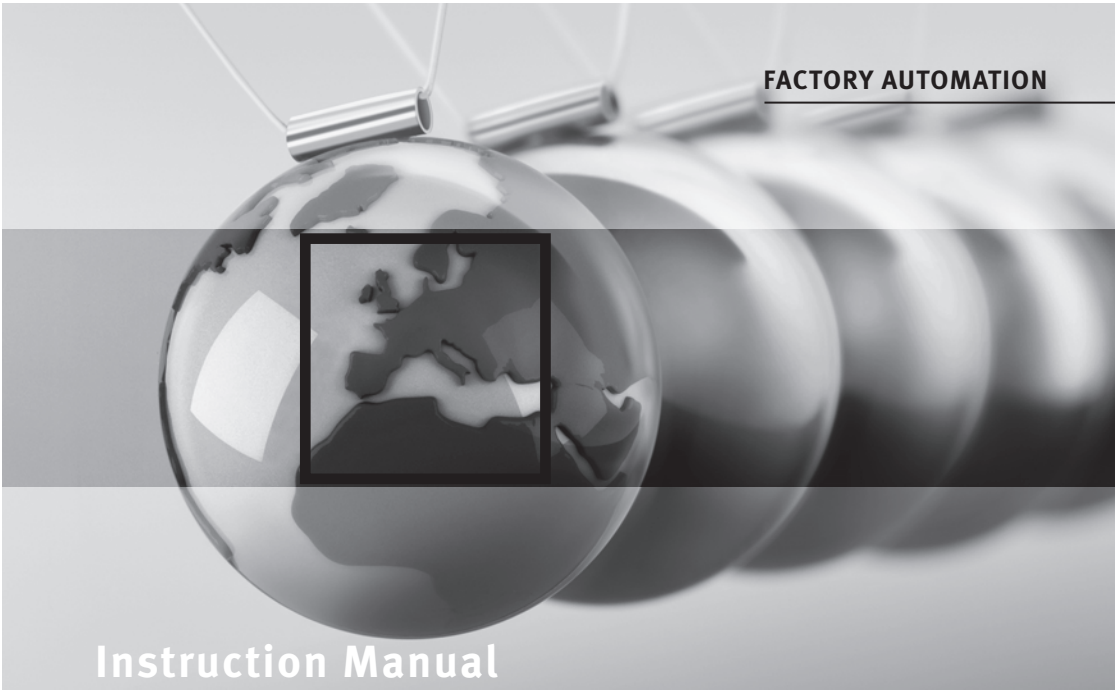
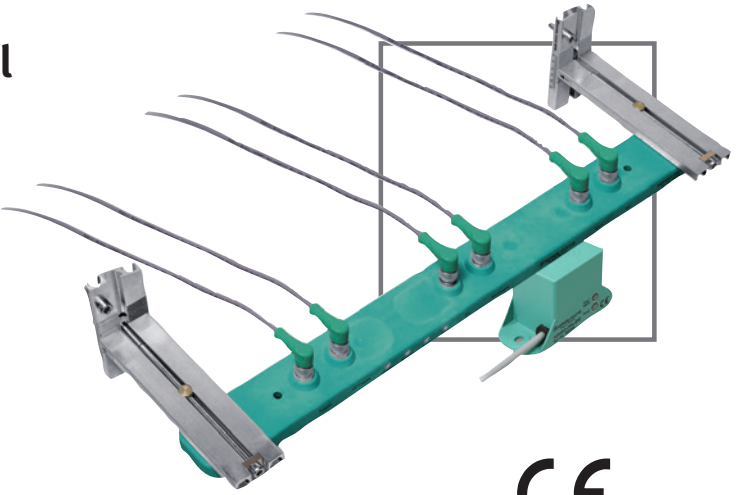
FACTORY AUTOMATION



Instruction Manual

NDN20-...
Block Control



CE

PEPPERL+FUCHS
SENSING YOUR NEEDS

Part. No. 201064 / DOCT-1208 / 4th May 2007

Used symbols

Warning

This symbol warns the user of potential danger. Nonobservance may lead to personal injury or death and/or damage to property.

Attention

This symbol warns the user of potential device failure. Nonobservance may lead to the complete failure of the device or other devices connected.

Note

This symbol calls attention to important notes.r

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

Security advice

Warning

This product must not be used in applications, where safety of persons depend on the correct device function.
This product is not a safety device according to EC machinery directive.

Notes

These operating instructions refer to proper and intended use of this product. They must be read and observed by all persons making use of this product. This product is only able to fulfill the tasks for which it is designed if it is used in accordance with specifications of Pepperl+Fuchs.

The warrantee offered by Pepperl+Fuchs for this product is null and void if the product is not used in accordance with the specifications of Pepperl+Fuchs.

Changes to the devices or components and the use of defective or incomplete devices or components are not permitted. Repairs to devices or components may only be performed by Pepperl+Fuchs or authorized work shops. These work shops are responsible for acquiring the latest technical information about Pepperl+Fuchs devices and components.Repair tasks made on the product that are not performed by Pepperl+Fuchs are not subject to influence on the part of Pepperl+Fuchs. Our liability is thus limited to repair tasks that are performed by Pepperl+Fuchs.

The preceding information does not change information regarding warrantee and liability in the terms and conditions of sale and delivery of Pepperl+Fuchs.

This device contains sub-assemblies that are electrostatically sensitive. Only qualified specialists may open the device to perform maintenance and repair tasks. Touching the components without protection involves the risk of dangerous electrostatic discharge, and must be avoided. Destruction of basic components caused by an electrostatic discharge voids the warrantee!

Subject to technical modifications.

Pepperl+Fuchs GmbH in D-68301 Mannheim maintains a quality assurance system certified according to ISO 9001.

CE

ISO**9001**

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

PEPPERL+FUCHS
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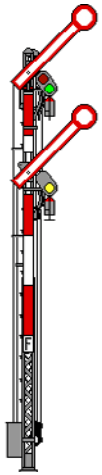
1 System Description



In the plant-internal material flow from the carcass to the final installation, telpher lines represent one of the most important conveyor systems in automotive construction. If a variety of complex procedures have to be coordinated, intelligent conceptions and innovative plant systems with perfect control system will be required.
The state-of-the-art block station sensor system by Pepperl+Fuchs is such an innovation.

First of all, a block station **NDN20-F97-EHB…** is primarily an active attenuation system which in the ideal case matches the corresponding inductive sensor **NDN20-F96-EFZ**. Depending on the state of the subsequent block section of a conveyor system, such as for example a telpher line, it attenuates the stationarily installed block station NDN20-F97-EHB…, sensor NDN20-F96-EFZ which is completely fitted on the vehicle and thus makes it stop, or the block station behaves in a passive manner and allows the vehicle to enter the track section. In this way, the entry into a switch will be prevented, if the switch is not in the correct position or if it prevents the collision with a leading vehicle in a curve.

The intelligent behavior of block station NDN20-F97-EHB… is a real innovation. The simpliest version, NDN20-F97-EHB100, is just enabled or switched passive by the signal of a superordinate control system. The other versions of block station NDN20-F97-EHB… are equipped with a different number of inputs. External sensors can be connected. In this way, the block station is able to evaluate even complex relationships in the conveyor system and to make available a corresponding block signal for vehicle sensor NDN20-F96-EFZ.

The **inductive proximity switches, model line L2** by Pepperl+Fuchs are ideally suited as control sensors. With their antivalent outputs (A0 and A2) they optionally offer high-active or low-active output signals.

However, in case of a fault or of a manual intervention in the process which otherwise is automated it will always be possible to overwrite the sensor signals by a master signal from the control system.

The **integrated code carrier**, type IPC11-30 of the Pepperl+Fuchs systems IP with 40 bit, freely programmable code offers numerous other possibilities of plant monitoring. Using a **Read Head** IPT1-FP with integrated evaluation and field bus interface or IPH-... together with the IDENT *Control* by Pepperl+Fuchs each vehicle can be clearly identified in the conveyor system - without additional installation costs for the installation of a code carrier.

Fields of application of the block control are:

- upstream of curves
- upstream of switches
- upstream of ascending or descending gradient sections
- upstream of lifters

A curve control in classical design always requires 2 sensors and a decentralized control system. This decentralized control system evaluates the signals of the sensors "entry" and "exit" and releases or locks the running rail. For this purpose, electric interruptions have to be cut into the power rail in addition.

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

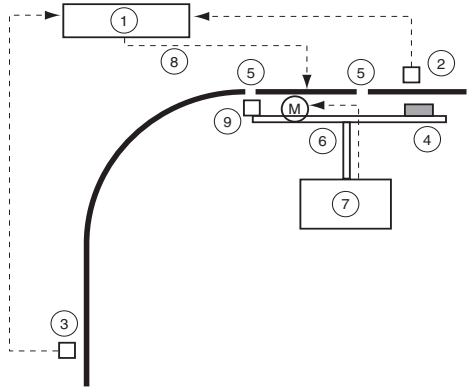


Fig. 1.1: Block control system for curve travel in classical version

(1) Decentralized control system
(2) Entry sensor (lock)
(3) Exit sensor (release)
(4) Actuator for sensors (2) and (3), completely fitted on the vehicle
(5) Power rail cut
(6) Telpher line vehicle
(7) Telpher line trolley control system
(8) Running rail power supply
(9) Collision protection/distance sensor

This expenditure will not longer be required if using the new block control system NDN20-... by Pepperl+Fuchs. Power rail cuts and decentralized control system are not required.

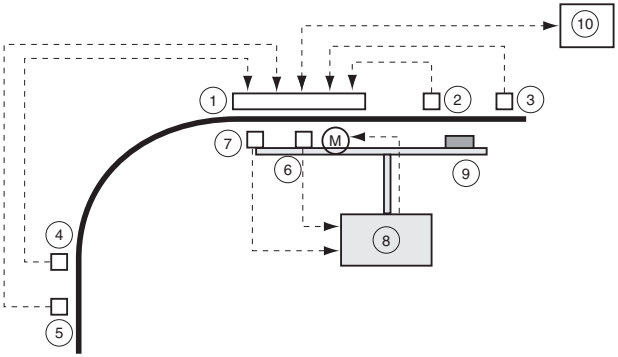


Fig. 1.2: Block control system for curve travel with block control system NDN20-...

(1) Block station NDN20-F97-EHB-...
(2) "Lock" sensor
(3) "Ident" sensor
(4) "1/2 release" sensor
(5) "Release" sensor
(6) Vehicle sensor NDN20-F96-EFZ
(7) Collision protection/distance sensor
(8) Telpher line trolley control system
(9) Actuator for sensors (2), (3), (4) and (5), completely fitted on the vehicle
(10) Plant control system

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

2 Components for the Structure of a Block Control System

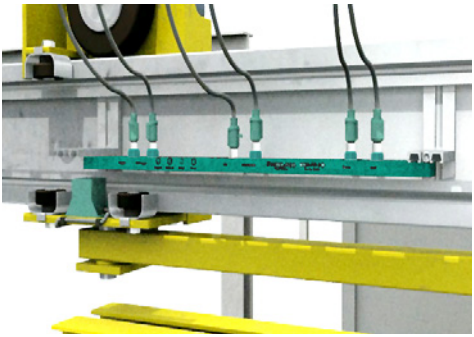
2. 1 Block Station NDN20-F97-EHB-xxx

Block station NDN20-F97-EHB-xxx is used as a replacement for the power rail cut in classical block control systems. .

Within its detection range of 500 mm the conveyor will stop if the block (e. g. curve) is occupied. If the block is free, the conveyor will continue its travel without any delay. Data transfer between block station NDN20-F97-EHB-xxx and vehicle sensor NDN20-F96-EFZ is done with inductive coupling.

Block station NDN20-F97-EHB-xxx transfers the stop or the start signal.

A power failure on the telpher line always will result in a stop, i. e. the conveyor will stop under the block station. Following conveyors will stop due to the function of the optical collision protection. If the plant supply is switched on again, operation will be resumed as usual.



Block station NDN20-F97-EHB-xxx is fastened in an easy way, e. g. with an universal holder MHW 01 on the telpher line. All connector inserts on the block station are oriented such that the cable outputs lead away from the telpher line if angled cable sockets are used, i. e. they lead to the fixed side. In this way, it is ensured that the leads cannot get caught in moving plant parts and that they will not be damaged.

Block station NDN20-F97-EHB-xxx is available in different extension levels with different functions, depending on the facts of a situation and requirements in the plant.

Block station type	Typical application	Release	1/2 release	PLC	PLC release	Lock	Ident
NDN20-F97-EHB-100	Lifter, switch			●			
NDN20-F97-EHB-400	Single block station with PLC intervention	●		●	●	●	
NDN20-F97-EHB-600	Comfort block station with preliminary release	●	●	●	●	●	●

Note

All block stations provide only of those pin-and-socket connectors which are required for the corresponding function. There are no unused pin-and-socket connectors. This facilitates the installation and at the same time it reduces the susceptibility for errors during the cabling.

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

LEDs

Block station NDN20-F97-EHBxxx provides up to 4 LEDs (depending on the block station type) which indicate its operating state. Table2.1 indicates the status of the display LEDs depending on the state of the block.

	LED			
State in the block	**Locked**	**Block ON**	**Occupied**	**Power**
Conveyor is upstream of the block	-	Green	-	Green
Attenuation element of the conveyor attenuates the "Ident" sensor	-	Green	Yellow	Green
Attenuation element of the conveyor attenuates the "Lock" sensor	-	Green	Yellow	Green
Attenuation element of the conveyor leaves the "Lock" sensor	Red	-	-	Green
Attenuation element of the conveyor attenuates the "1/2 release" sensor12	Yellow	-	-	Green
Attenuation element of the conveyor attenuates the "Release" sensor	-	Green	-	Green

Table 2.1 Display LEDs of block station NDN20-F97-EHB600

Outputs of Block Station NDN20-F97-EHBxxx

Block station NDN20-F97-EHB600 disposes of 2 outputs by means of which the state of occupation in or on the block is transfered to the PLC. The "vehicle" output is enabled when the vehicle enters the block ("Ident" sensor OR "Lock" sensor is attenuated).

The output "Block state" will be enabled as soon as the vehicle is in the block. It will be disabled again as soon as the conveyor passed the "1/2 release" and "release" sensors in the correct sequence.

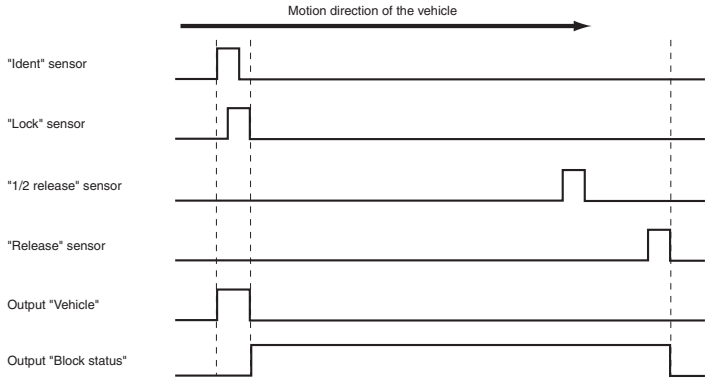


Fig. 2.1: Output states of block station NDN20-F97-EHB600

Inputs of the block station

Versions xxx = 400 or 600 of block station NDN20-F97-EHBxxx disposes of 2 high-active inputs via which the PLC can have superordinate influence on the block control. The PLC signals have priority over the regular block status at any rate. If the block is locked via the PLC, this locked state will be signaled back to the PLC via the "Block state" output.

The block station NDN20-F97-EHB100 provides only one high active input, which is activated by the PLC to let vehicles pass. In case of a low-signal applied to the input, the vehicle stops.

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

2. 2 Vehicle Sensor NDN20-F96-EFZ

Vehicle sensor NDN20-F96-EFZ is fixed directly between the rollers of the conveyor.

Vehicle sensor NDN20-F96-EFZ is connected to the vehicle control and transmits its stop or release signal to the vehicle control. The drive of the vehicle thus receives a stop or travel command.

If the conveyor runs below a block station NDN20-F97-EHB-xxx which sends a release signal, the conveyor will continue its travel without any loss of speed or time.

LEDs

Vehicle sensor NDN20-F96-EFZ disposes of an indication of its operating state via 2 LEDs. Table2.2 indicates the status of the display LEDs depending on the block's state.

	LED		Output
State of block station NDN20-F97-EHBxxx	**Stop/travel**	**Power**	
Block station NDN20-F97-EHBxxx sends the "STOP" signal. Vehicle sensor NDN20-F96-EFZ is attenuated.Vehicle is not allowed to travel.	Red	Green	Inactive
Block station NDN20-F97-EHBxxx sends the "TRAVEL" signal. Vehicle sensor NDN20-F96-EFZ is undamped. Vehicle is allowed to travel.	Green	Green	Active

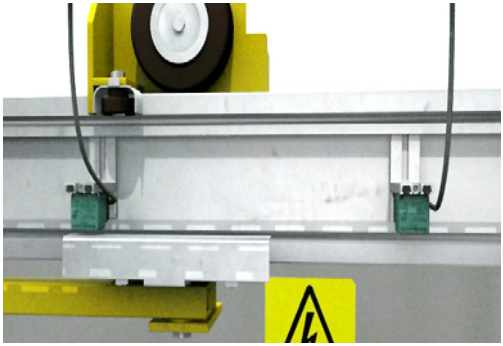
Table 2.2 Display LEDs in vehicle sensor NDN20-F96-EFZ

2. 3 "Ident" and "Lock" Sensors

The two sensors "Ident" and "Lock" are fitted at a distance of 150 mm from each other at the beginning of a block. The measure of 150 mm results from two sizes. The first size is the waiting position of a length of 500 mm which results from the dimensions of block station NDN20-F97-EHB-xxx. The second size is the size of the attentuation element on the rear trolley (is attenuates all inductive proximity switches in the plant) with a length of 350 mm. The objective is to detect a conveyor below the block station over the complete length of 500 mm. For these reasons, 2 sensors will be required. For this purpose, a block station NDN20-F97-EHB-600 has to be used. Only these block stations dispose of the possibility to connect an "Ident" sensor. If a detection of less than 350 mm is sufficient, the "Ident" sensor is not absolutely required and the use of a block station NDN20-F97-EHB-400 is sufficient.

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

The two sensors "Ident" and "Lock" inform the block station that a conveyor is below the waiting position or that it is just arriving there. We recomend to use our proximity switch NBB20-L2-A2-C-V1 as "Ident" sensor and as "Lock" sensor.



2. 4 "1/2 release" and "Release" Sensors

For the installation of the two sensors "1/2 release" and "Release" there are no instructions with regard to the installation distance. The only applicable rule says that along the travel path of the conveyor, first the "1/2 release" sensor and only subsequently the "Release" sensor has to be attenuated.

We recomend to use our proximity switch NBB20-L2-A2-C-V1 as "1/2 release" sensor and as "Release" sensor.

The "Release" sensor will transmit a release signal to the block station if the conveyor leaves the block section.

Note

Important note if NDN20-F97-EHB600 is used!
When the "Release" sensor is attenuated, there will not be a block release, unless before the "1/2 release" sensor has been attenuated. This sequence has to be observed.

In this way, the "1/2 release" sensor will avoid an unsafe switching, if, e. g. the conveyors are lined up and if a conveyor just stops under the "Release" sensor with its attenuation element so that it is attenuated while the vehicle slightly slips back into the curve.

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

3 Vehicle Identification with Identification System IP

3. 1 Data Carrier in the Vehicle Sensor NDN20-F96-EFZ

In addition, a data carrier of type IPC11-30 is integrated into vehicle sensor NDN20-F96-EFZ. This data carrier disposes of a 40-bit code which the user can program freely. The codes stored in the data carrier can be used for the vehicle identification and thus, for a plant evaluation or for a selective vehicle control. The position of the integrated data carrier can be taken from the "Dimensions" drawing of vehicle sensor NDN20-F96-EFZ on Page 13.

The read/write device has to be fitted in a suitable position so that the data carrier can be securely read while the vehicle passes by. Above all, the distance between read/write device and integrated data carrier is important. On Page 14 you will find the response curves for writing and reading of data in dependence of the used read/write device.

4 Technical Data of the System Components

4. 1 Block Station NDN20-F97-EHB600

The data which are indicated here refer to the block station variant with max. functionality: NDN20...600

For block stations with less functions the indications regarding type of connection, electrical connection and with regard to the shown connections in the dimensions drawing will be different accordingly (see section 2. 1).

4.1.1 Technical Data

General specifications	
Installation	not embeddable
Output polarity	DC
Nominal values	
Operating voltage U_B	24 V DC
Reverse polarity protected	with reverse polarity protection
Short circuit protection	phased
Operational current I_L	0 ... 100 mA
Indication of the operating voltage	LED, green
Indication of the switching state	LED red/yellow: locked/half release LED green: Block ON LED yellow: Block occupied
Ambient conditions	
Ambient temperature	0 ... 50 °Celsius (273 ... 323 K)
Mechanical specifications	
Type of connection	1 x connector M12 x 1, 4 pin 5 x socket M12 x 1, 4 pin
Housing material	ABS
Front surface	ABS
Protection degree	IP67

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

4.1.2 Electrical Connection

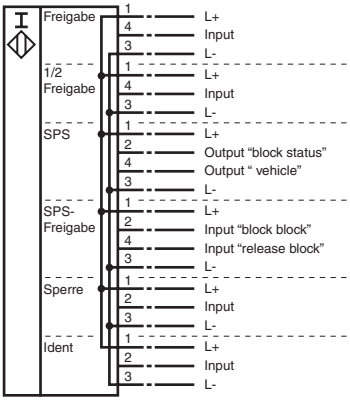


Fig. 4.1: Electrical connection NDN20-F97-EHB600

4.1.3 Dimensions

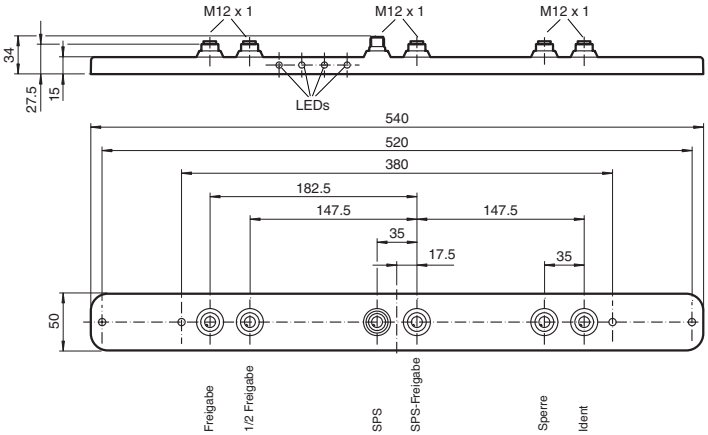


Fig. 4.1: Dimensions NDN20-F97-EHB600

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

4. 2 Vehicle Sensor NDN20-F96-EFZ

4.2.1 Technical Data

General specifications	
Operating distance s_n	20 mm
Installation	not embeddable
Output polarity	DC
Secured operating distance s_a	0 ... 16.2 mm
Nominal values	
Operating voltage U_B	24 V DC
Operating frequency f	0 ... 150 Hz
Reverse polarity protected	with reverse polarity protection
Short circuit protection	phased
Operational current I_L	0 ... 100 mA
Indication of the operating voltage	LED, green
Indication of the switching state	LED red/green: Stop/travel
Ambient conditions	
Ambient temperature	0 ... 50 °Celsius (273 ... 323 K)
Mechanical specifications	
Type of connection	Cable with connector M12 x 1
Housing material	PA
Front surface	PA
Protection degree	IP67
Cable length L_K	0.5 m

4.2.2 Electrical Connection

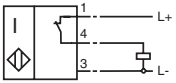


Fig. 4.1: Electrical connection NDN20-F96-EFZ

4.2.3 Dimensions

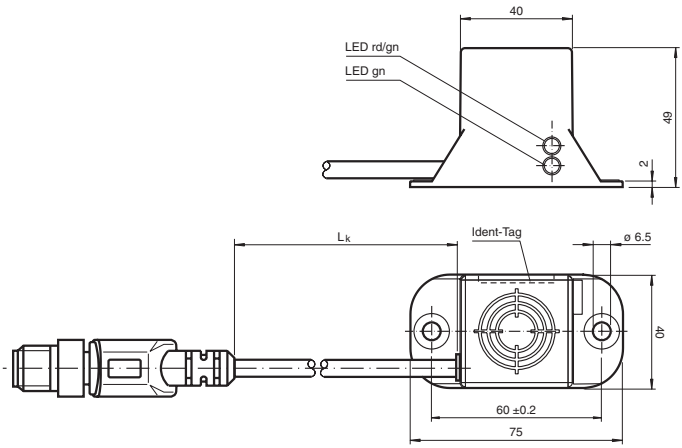


Fig. 4.1: Dimensions NDN20-F96-EFZ

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

4.2.4 Technical Data of the integrated Data Carrier IPC11-30

General specifications	
Actual frequency	125 kHz
Transfer rate	2 kBit/s
Distance	read: 28 mm ... 50 mm write: 20 mm ... 35 mm (depending on the scanner)
Memory	
Type/size	EEPROM 264 bits (thereof, 40 bits can be used as special fixed code)
Read cycles	unlimited

4.2.5 Response Curve of the integrated Data Carrier IPC11-30

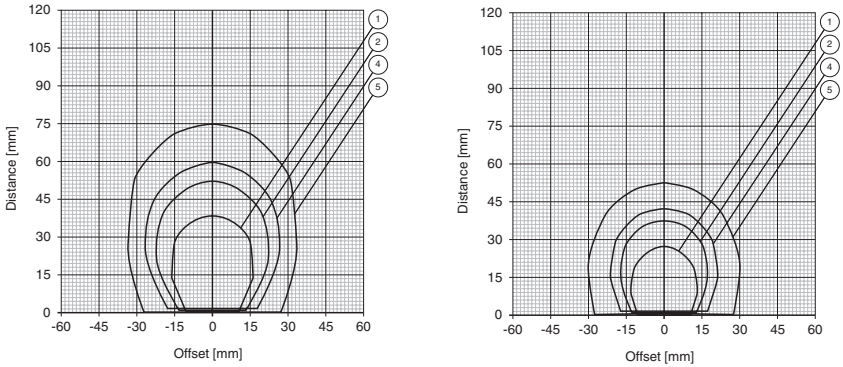


Fig. 4.1: Response curve IPC11-30, reading writing

The represented curves refer to the use of the following read/write heads:

(1) IPH-18GM-V1
(2) IPH-30GM-V1
(4) IPH-L2-V1
(5) IPH-FP-V1

In addition, the following write/read heads or write/read devicescan be used:

- IPH-F61-V1
- IPT-HH20 (handheld for mobile operation)
- IPT1-FP (with suitable interface adapter U-P... for steady state operation)

The read/write heads IPH-... are designed to be used in combination with an evaluation unit IDENT *Control* IC-KP... .

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

4. 3 Auxiliary Sensors NBB20-L2-A2-C-V1

These sensors are used to generate the signals for "Ident", "Lock", "1/2 release" and "Release" (see section 2. 3 and see section 2. 4).

4.3.1 Technical Data

General specifications	
Function of the switching element	PNPantivalent
Operating distance s_n	20 mm
Installation	embeddable
Output polarity	DC
Secured operating distance s_a	0 ... 16.2 mm
Reduction factor r_{Al}	0.33
Reduction factor r_{Cu}	0.31
Reduction factor r_{V2A}	0.74
Reduction factor r_{Ms}	0.41
Nominal values	
Operating voltage U_B	10 ... 30 V
Operating frequency f	0 ... 10 Hz
Hysteresis H	Typical 5 %
Reverse polarity protected	with reverse polarity protection
Short circuit protection	phased
Voltage drop U_d	≤ 3 V
Ratinng data	
Operational current I_L	0 ... 200 mA
Residual current I_r	0 ... 0.5 mA
No load current I_0	≤ 20 mA
Indication of the operating voltage	LED, green
Indication of the switching state	LED, yellow
Conformity to standard	
Standards	IEC / EN 60947-5-2:2004
Ambient conditions	
Ambient temperature	-25 ... 85 °Celsius (248 ... 358 K)
Storage temperature	-25 ... 85 °Celsius (248 ... 358 K)
Mechanical specifications	
Type of connection	connector M12 x 1, 4 pin
Housing material	PA 6 Grivory GVN-35H
Front surface	PA 6 Grivory GVN-35H
Protection degree	IP69K

4.3.2 Electrical Connection

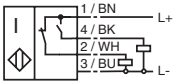


Fig. 4.1: Electrical connection NBB20-L2-A2-C-V1

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

4.3.3 Dimensions

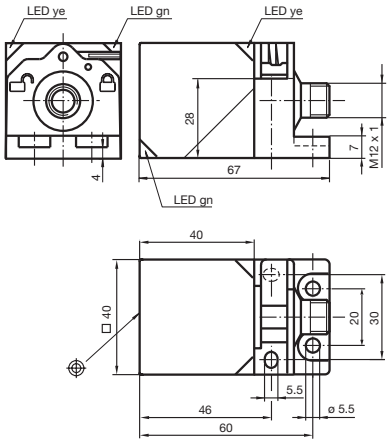


Fig. 4.1: Dimensions NBB20-L2-A2-C-V1

4. 4 Read/Write Heads for Vehicle Identification

Due to the numerous read/write heads which can be used for vehicle identification it is not possible at this point to give a complete list of the data sheets.

For the technical data of the read/write heads

- IPT1-FP (with suitable interface adapter U-P...)
- IPH-18... (for use in combination with IDENT *Control*)
- IPH-30... (for use in combination with IDENT *Control*)
- IPH-L2... (for use in combination with IDENT *Control*)
- IPH-FP... (for use in combination with IDENT *Control*)
- IPH-F61... (for use in combination with IDENT *Control*)

please refer to our Internet web site

http://www.pepperl-fuchs.com

Note

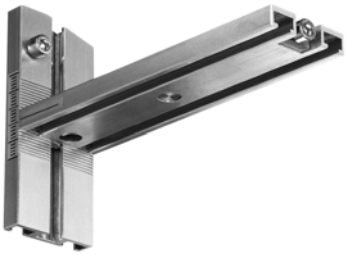
During the commissioning of the identification system it will be required to adjust the read/write head to the data carrier. This is performed via the configuration on the IDENT Controlreading heads IPH...) or via the plant control (reading heads IPT1...). When using read/write heads by Pepperl+Fuchs, the parameters of data carrier type 11 have to be set.

Date of issue: 4th May 2007 Part No. 201064 Document No. DOCT-1208

5 Accessories

5. 1 Mounting Aid MHW 01

The mounting aid MHW 01 is excellently suited for mounting of the block station NDN20-F97-EHBxxx and of the auxiliary sensors for the generation of the "Ident", "Lock", "1/2 Release" and "Release" control signals.



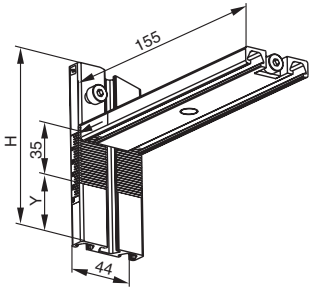


Fig. 5.1: Dimensions MHW 01

5. 2 Cables for the electrical Connection of the Components

For the electrical connection of the auxiliary sensors for the generation of the "Ident", "Lock", "1/2 Release" and "Release" control signals with the block station, our 4 pin connection cables are suited which are available in different lengths:

- V1-G-2M-PVC-V1-W
- V1-G-5M-PVC-V1-W
- V1-G-10M-PVC-V1-W
- V1-G-20M-PUR-V1-W

For the electrical connection of the block station with the PLC, our 4 pin cable sockets available in different lengths are suited:

- V1-W-5M-PVC
- V1-W-10M-PVC
- V1-W-20M-PVC

For the release/lock of the block station via the PLC, our 4 pin cable sockets available in different lengths are suited:

- V1S-W-5M-PVC
- V1S-W-10M-PVC
- V1S-W-20M-PVC

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6 Notes

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