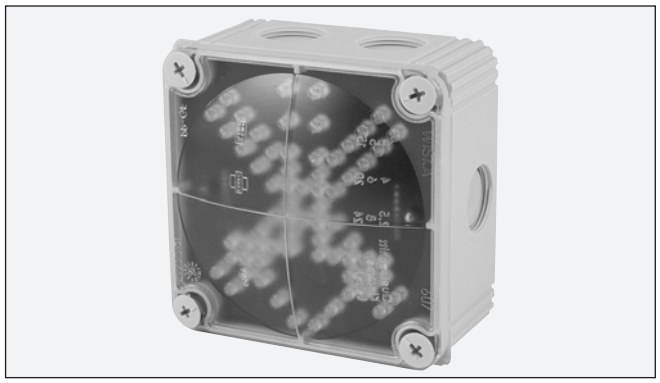
Dupline car park system
Type GP 6565 0201
Direction indicator with red and green LED



- **Quick indication of free parking spaces**
- **Low power consumption**
- **Brightly lit indicator LED**
- **Built-in direction indicator to protect it against dust and moisture**
- **3-wire system with Dupline**
- **Programmable using GAP 1605 for Dupline bus L_1**
- **Internally programmable using rotary switch for Dupline bus L_2**

Product Description

The GP6565 0201 direction indicator forms part of the Car Park system which contains several variants of sensors and passive LED modules. Furthermore, the car park system contains displays for displaying the number of free parking spaces.
The direction indicator is installed over the roadway and points out the correct route to the driver using brightly lit green LED arrows. Direction indicators with red crosses indicate areas that are either pre-booked or occupied.
It is possible to install up to 36 direction indicators on the same network.
The direction indicator is the intelligent part of the car park system, and using different settings it is possible to create different functions, depending on the user's requirements and the size of the facility.

Ordering Key

GP 6565 0201

Type: Dupline®
Housing
Input Type
Channels
Inputs
Mains

Type Selection

GP 6565 0201 **Direction indicator, red/green**

Input/Output Specifications

2-pin connector for Bus L_1
- **Pin 1: Dupline - (L_1 bus)**
- **Pin 2: Dupline + (L_1 bus)**

3-pin connector for Bus L_2
- **Pin 1: Dupline + (L_2 bus)**
- **Pin 2: GND Minus supply or Dupline minus (L_2 bus)**
- **Pin 3: 24 VDC external power supply (L_2 bus)**

RJ45 connector for address programming using GAP 1605

3-pin connector for RS485
- **Pin 1: A (RS485)**
- **Pin 2: Dupline - or GND (L_1 bus)**
- **Pin 3: B (RS485)**

Supply Specifications

Power supply:	24 V DC min.; 30 VDC max. (Overvoltage category III (IEC60664))
Current consumption from L_1 bus:	< 1 mA
Current consumption from L_2 bus:	< 1 mA
Current consumption from external power supply:	212 mA
Power consumption:	< 5 W
Electrical insulation between Dupline bus L_1 and L_2:	1,500 Vrms

General Specification

LED indication:	
Occupied:	Red cross lit constantly
Space available:	Green arrow lit constantly
The direction indicator uses four Dupline channels and can be programmed as follows:	
• Channel 1: Start marker	Input
• Channel 2: End marker	Input
• Channel 5: Start marker	Output
• Channel 6: End marker	Output
• Channels 1 and 5 are a Start marker which is the Dupline address before the first sensor	
• Channels 2 and 6 are a End marker which is the Dupline address after the last sensor	

Connector for RS485:

- Follows the interface standard for EIA-RS485
- Data speed is 4,800 bps
- Flux of the data
  - Asyncronous mode, continuous receiving with no answer
  - Frame composition: 3 x (1 start bit + 8 data bit + 1 stop bit)

Note:
The starting of the frame is syncronised with the last positive edge of the Dupline frame with a delay of 1 mSec

Environment

- **Protection: IP 66**
- **Operating temperature: -25 °C to 70°C (-13°F to 158°F)**
- **Storage temperature: -40°C to 85°C (-40°F to 185°F)**
- **Pollution degree: 3 (IEC 60664)**
- **Relative humidity: Maximum 93%**
- **Dimensions: 110 x 110 x 66 mm**
- **Material: The housing is made of polypropylene. The direction indicator lid is made of clear Polycarbonate**

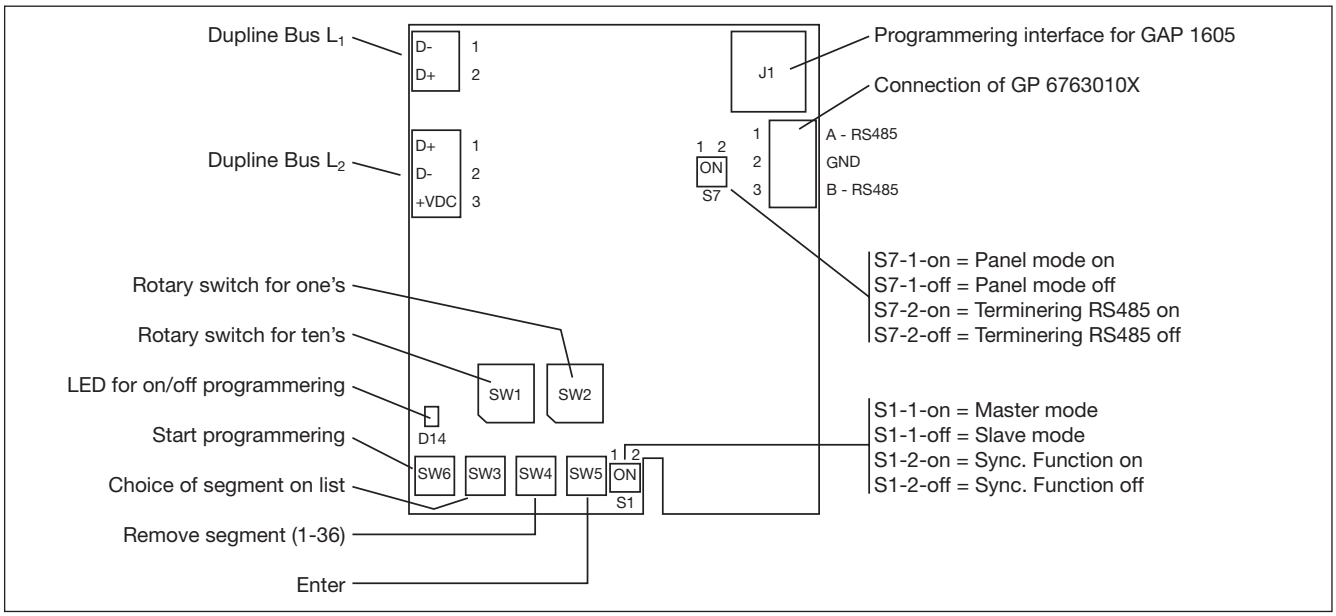
Mode of operation

The GP6565 0201 direction indicator is the intelligent part of the car park system. Its primary purpose is to read the number of free parking spaces. Its secondary function is to transmit this information, e.g. to displays GP6763 010X.The direction indicator also uses the information gathered to guide the cars around in the parking area using a green arrow or a red cross, respectively.
The unit consists, among other things, of two galvanically separate Dupline buses L_1 and L_2.The two buses are programmed using GAP 1605 or locally using rotary switches and switches. The programming and connection of the two buses depends on the mode for which the system is set. The four different modes and the programming will be explained later.

Depending on the mode selected, either display GP6763 010X or an intelligent unit can be connected to the connector for RS485. The GP6763 010X is a passive unit that can indicate the number of free parking spaces or be used as a monitor when programming the GP6565 0201.
All Dupline addresses can be used, except the address used for multiple calibration. The address used for this purpose is normally A1, but is selectable.

Example of GAP programming:
I/O 1 and 5 = A2 marker start
I/O 2 and 6 = N2 marker end
This means that there are 103 sensors in this system.

Internal drawing of direction indicator and explanation of functions



Programming modes

The direction indicator can be set for different modes according to requirements. Remember to set the DIP switches before the power supply is turned on.
The different modes are designated as follows:

- Sync. operating mode
- Master operating mode
- Slave mode
- Panel mode

Sync. operating mode (Synchronization)

This mode is configured by setting DIP switch S1-2 (on).
Sync. mode can only be allocated to one GP6565 0201 in every system. The GP6565 0201 set to sync. mode can concurrently be set to either master mode or slave mode.
Sync. mode operates only on L_2. This means, if several directions indicators are connected via L_2, only one must be set into sync. mode.

Master operating mode

This mode is configured by setting DIP switch S1-1 (on).
Master mode is also a summary mode where all available parking spaces (from the sensors) are collected from L_2. L_1 is not used in this mode. If anything is connected to L_1 in master mode, this data will thus be ignored.
Only one direction indicator in this network can be set to sync. mode. It is possible to connect several direction indicators to the system without sync., in order to see the total or individual number of free spaces, regardless of position on the bus.
The direction indicator will indicate a green LED if there are available spaces, whereas it will indicate a red cross if no spaces are free. This data will be transferred simultaneously to display GP6763 010X through a RS485 interface.

Programming procedure
The direction indicator must be taught the areas to be controlled. This is done via the internal programming inside the direction indicator. The internal programming takes place using switches and rotary switches on the direction indicator PCB and has nothing to do with Dupline addresses and Dupline programming.
Press SW6 for approx. 1 sec. to activate the programming mode. LED D14 will turn off briefly.
If nothing is pressed for 15 sec., the programming mode will exit.
Deleting the memory in GP6565 0201:
Set SW1 and SW2 respectively to 99. Press SW5 for approx. 1 sec. LED D14 will confirm deletion of the memory by turning off briefly for approx. 2 seconds.
Programming of segments (1-36) is set on SW1 and SW2, respectively, and confirmed by pressing SW3 (enter). This is confirmed by LED D14 which will turn off briefly for approx. 1 second. If you want to enter more segments, repeat the above procedure.
It is also possible to delete segments. Set SW1 and SW2 to the desired segment and press SW4 for approx. 1 second. LED D14 will confirm this by turning off briefly for 1 second.
By setting SW1 and SW2 to 00, it is possibly, by pressing SW5, to scroll through the program. Read the settings directly on display GP6763 010X.

ACTION	SW--SW2 setting	Button to be pressed	LED	Indication on GP6763010x
Entering into procedure	--	SW6	OFF ➔ ON	P 00
Clear all the memory	99	SW5	OFF x 2”	C00
Segment number to be inserted	N. of segment	SW3	OFF x 1”	A00
Segment number to be removed	N. of segment	SW4	OFF x 1”	R00
See complete list of programmed area	00	Sw5	OFF x 2”	L00

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Slave operating mode

This mode is configured by setting DIP switch S1-1 (off).
This is a “stand alone” mode without external control (PC, PLC or similar). Slave mode uses both Dupline buses L_1 and L_2. In slave mode, the direction indicator will take the number of free parking spaces from L_1 and put them into a segment on L_2. The direction indicator will indicate a green LED if there are available spaces, whereas it will indicate a red cross if no spaces are free. This data will be transferred simultaneously to display GP6763 010X through a RS485 interface.
There will be no need for L_2 if there is no connection between the direction indicators. The direction indicators can detect this automatically.
If L_1 is disconnected by accident, the direction indicator LED will show a red cross.

The L_2 Bus is reserved only to connect all the indicators distributed along the park building, as it supports a special data protocol. On this Bus the indicators working in SLAVE mode insert binary data, with the meaning of vacant car places available in a determined area. This function is supported by a dedicated protocol derived from the standard one; this protocol uses 4 consecutive frames of the original Dupline protocol.
A coding status for allocating up to 36 indicators should be provided by one of the indicators previously configured in SYNC operating mode. This coding status divides each frame into 9 data fields 14 bit wide with 6 bit for address of indicator and 8 bit as the meaning of vacant car place.

Channel mapping of the indicators in the L_2 Dupline frame

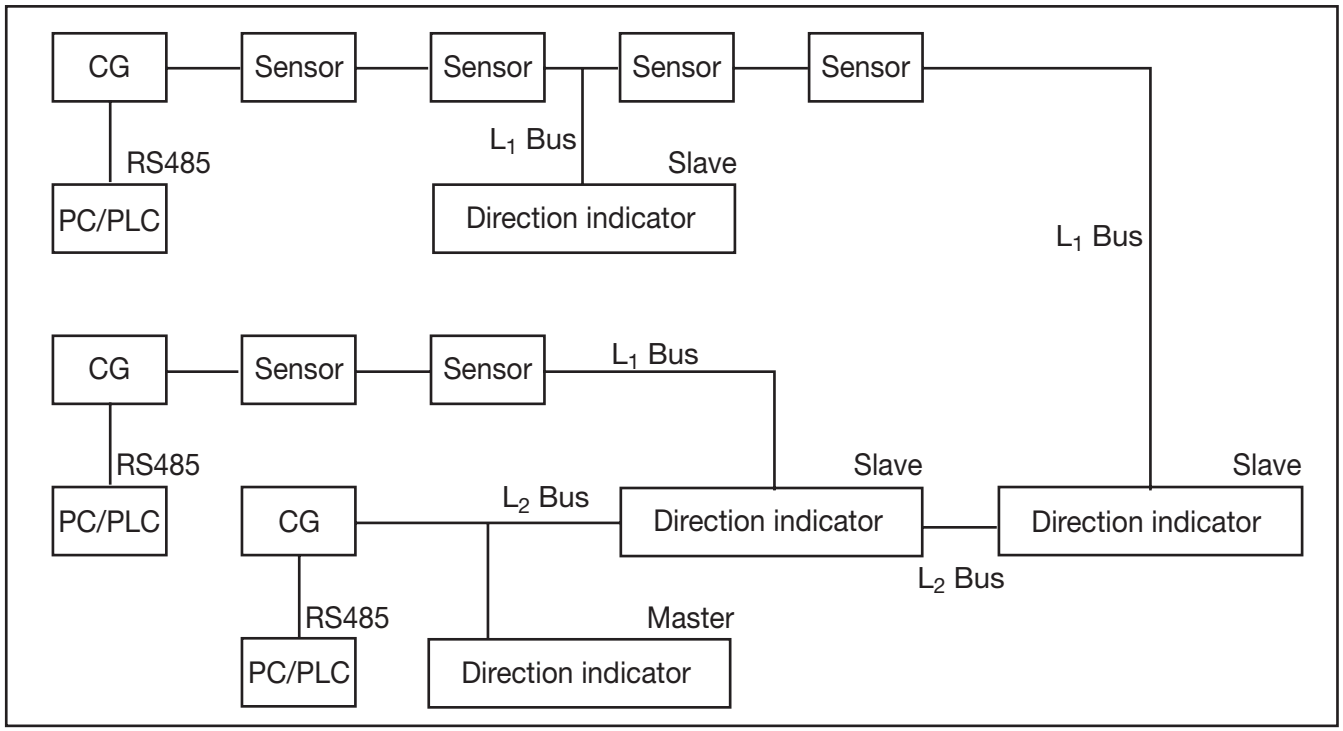
L_2 assignment with indicator configured in MASTER or SLAVE mode

1st frame	Adress assignment	Data assignment
Direction indicator channel N.36	A1 - A6	A7 - B6
Direction indicator channel N.35	B7 - C4	C5 - D4
-	-	-
Direction indicator channel N.29	M3 - M8	N1 - N8
Direction indicator channel N.28	O1 - O6	O7 - P6

2nd frame	Adress assignment	Data assignment
Direction indicator channel N.27	A1 - A6	A7 - B6
Direction indicator channel N.26	B7 - C4	C5 - D4
-	-	-
Direction indicator channel N.20	M3 - M8	N1 - N8
Direction indicator channel N.19	O1 - O6	O7 - P6

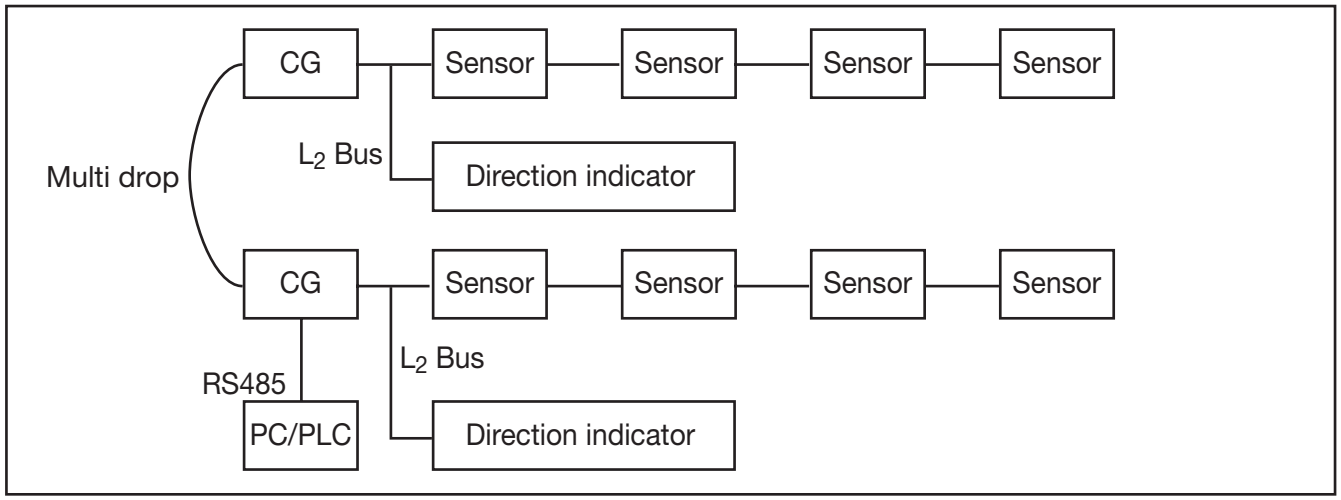
3rd frame	Adress assignment	Data assignment
Direction indicator channel N.18	A1 - A6	A7 - B6
Direction indicator channel N.17	B7 - C4	C5 - D4
-	-	-
Direction indicator channel N.11	M3 - M8	N1 - N8
Direction indicator channel N.10	O1 - O6	O7 - P6

4th frame	Adress assignment	Data assignment
Direction indicator channel N.9	A1 - A6	A7 - B6
Direction indicator channel N.8	B7 - C4	C5 - D4
-	-	-
Direction indicator channel N.2	M3 - M8	N1 - N8
Direction indicator channel N.1	O1 - O6	O7 - P6



Panel operating mode

This mode is configured by setting DIP switch S7-1 (on). This is the lowest mode and is used if there is a need for remote control (PC, PLC etc.). Only one bus L2 is used. L1 must not be connected to the direction indicator.



L_2 assignment with indicator configured in PANEL mode

Configuration	SLAVE on L_1	SLAVE on L_2	MASTER on L_2	Panel on L_2
Channel occupancy	2 (for markers)	6 (bit for adress) + 8 (for data)	6 (bit for adress) + 8 (for data)	8 (for data)

Channel mapping of the sensors

Channel mapping of the sensors in the L_1 Dupline frame

L_1 assignment with all sensors configured at full capability (4 channel configuration)

Dupline assignment	Channel 1	Channel 5	Channel 6	Channel 7
Sensor N.1	A2	A3	A4	A1
Sensor N.2	A5	A6	A7	A1
-	-	-	-	-
Sensor N.41	P2	P3	P4	A1
Sensor N.42	P5	P6	P7	A1

L_1 assignment with all sensors configured at reduced capability (2 channel configuration)

Dupline assignment	Channel 1	Channel 7		
Sensor N.1	A2	A1		
Sensor N.2	A3	A1		
-	-	-		
Sensor N.126	P7	A1		
Sensor N.127	P8	A1		

L_1 assignment with sensors at reduced capability and one Direction indicator

Dupline assignment	Sensor Channel 1	Sensor Channel 7	Indicator Start marker	Indicator End marker
Sensor N.1	A3	A1		
Sensor N.2	A4	A1		
-	-	-		
Sensor N.123	P5	A1		
Sensor N.124	P6	A1		
Direction indicator			A2	P7*

***NOTE:** P8 channel (the 128th channel of the frame) must not be assigned to the End marker of indicator

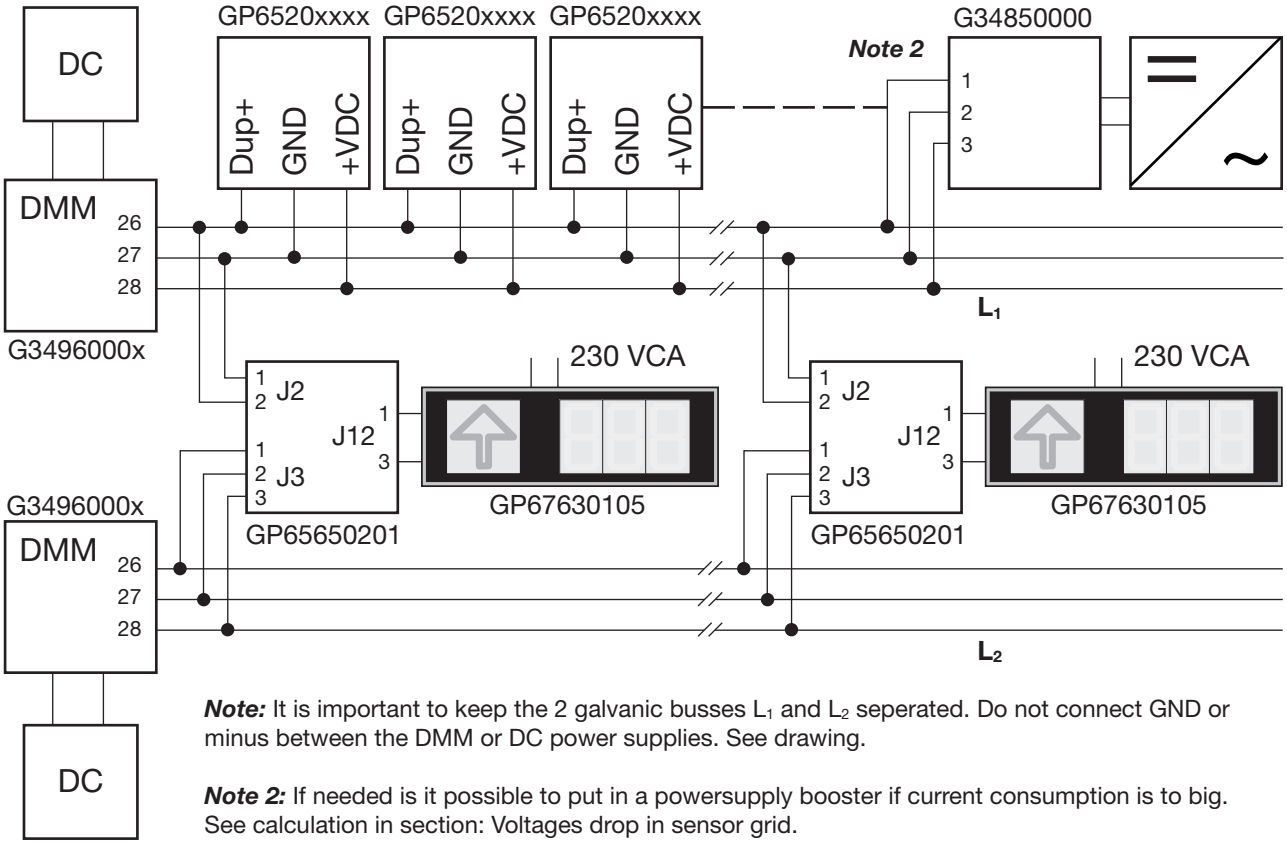
Channel mapping of the sensors in the L_2 Dupline frame

L_2 assignment with indicator configured in PANEL mode

Dupline frame	Data assignmment			
Direction indicator channel N.1	A1 - A8			
Direction indicator channel N.2	B1 - B8			
-	-			
Direction indicator channel N.15	O1 - O8			
Direction indicator channel N.16	P1 -P8			

Example of a system in slave mode with tree sensors, two direction indicator and two displays

The direction indicator are set up as “slave” using switches. It is programmed using GAP 1605.
Channels 1 and 5 are programmed to “A2” (marker start).
Channels 2 and 6 are programmed to “A6” (marker end).
The sensors are addressed “A3”, “A4” and “A5”, respectively, also using GAP 1605. The direction indicator now automatically knows which sensors to detect, because it looks at all addresses between start and end marker. This means that there can be many direction indicators on the same Dupline network.
The display also have a function as a monitor when programming the direction indicator.



Note: It is important to keep the 2 galvanic busses L_1 and L_2 seperated. Do not connect GND or minus between the DMM or DC power supplies. See drawing.

Note 2: If needed is it possible to put in a powersupply booster if current consumption is to big. See calculation in section: Voltages drop in sensor grid.

Voltages drop in sensor grid

Due to the high current consumption of each sensor module, precautions should be taken to avoid voltage drops in the sensor network.
As indicated, the car park system is a 3-wire system.
Different power supply types can be used to supply the sensors, including third-party power supplies. Dupline provides two different power supply couplers: G3485 0000, which is a power supply coupler, or DMM G3496 xxxx, which also includes an integrated channel generator.
They both feature a pulsating 30 VDC/3 A output on the third wire.
The DC supply for G3485 0000 is capable of supplying twice the total load current, as the output voltage on G3485 0000 is pulsating.

The following considerations are made for using G3485 0000:

The voltage drop for the output on G3485 0000 is **≤** 1.0 V. That is, for a 30 VDC input on the module you can achieve a maximum output of 29 VDC. Together with the voltage drop for the output of the GP65xx xxxx sensor, this must be taken into consideration when selecting the output voltage for the DC supply.

The voltage drop on the GP65xx xxxx sensors is calculated as: Uout G3485 0000 – Uin GP65xx xxxx = 29-22 = **7 V**

There is a limit for the voltage drop Vcw in the longest common wire. This can be calculated as follows:
Vcw = Rcw x Itl

Vcw = Voltage drop in longest common wire
Icw = Total current in longest common wire
Rcw = Resistance in longest common wire

If the load is distributed evenly along the 3-wire, Vcw = **3.5 V max.**
Vcw = (Vout (G3485 0000)-Vin (G6520 220x))/2 = (29-22)/2 = 3.5 V

In order to avoid voltage drops in the system, further G3485 0000 supply units can be added along the wire.

Note:
Remember to install the DC supply and the G3485 0000 supply unit close to each other to avoid voltage drops between the two modules. See the wiring diagram on the following page.

Calculation example for maximum wire length, sensor side:
Network with 30 sensors:

- G3485 0000 power supply output voltage = 29 VDC
- 30 GP6520 2201 sensors with 37 mA current consumption
- Cable = 1.5 mm^2. Cable resistance = 13 Ω/km
- Total current consumption = 30 x 37 = 1110 mA

Note: Please note that the calculation of the direction indicator's current consumption is made on the L_2 bus, not on the L_1 bus. Therefore, the indicator is not included in the total current consumption of this calculation.

At a voltage drop for G3485 0000 of 3.5 V, the internal resistance is:
R = 3.5 V / 1110 mA = 3.15 Ω
Maximum wire length = 3.15 Ω/2 x 13 Ω/km = **121 metres**

Calculation example for maximum number of sensors at a specific wire length:

- Wire length stated at 500 m = (0.5 km)
- Cable type = 1.5 mm2. Cable resistance = 13 Ω/km
- Max. voltage drop = 3.5 VDC
- Max. current consumption for sensor = 37 mA

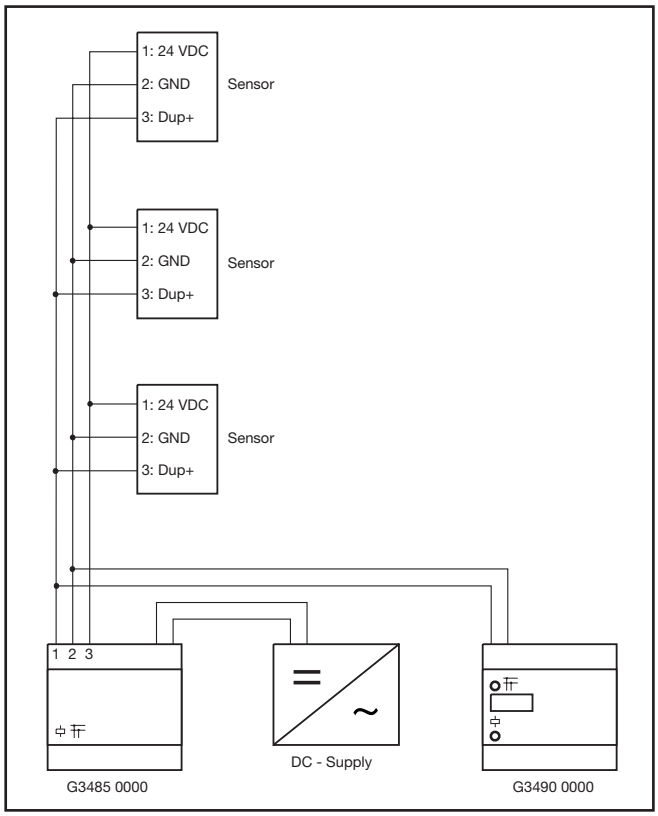
Total wire resistance = 2 x 0.5 km x 13/km = 13 Ω

Max. current consumption = 3.5 / 13 = 269 mA

Maximum number of sensors in the network: 269 / 37 = **7 sensors**

Rule of thumb:
For each power supply, 30 sensors can be placed at 3 m distance from each other when using a 1.5 mm^2 cable.

Example of Wiring Diagram



Dimensions