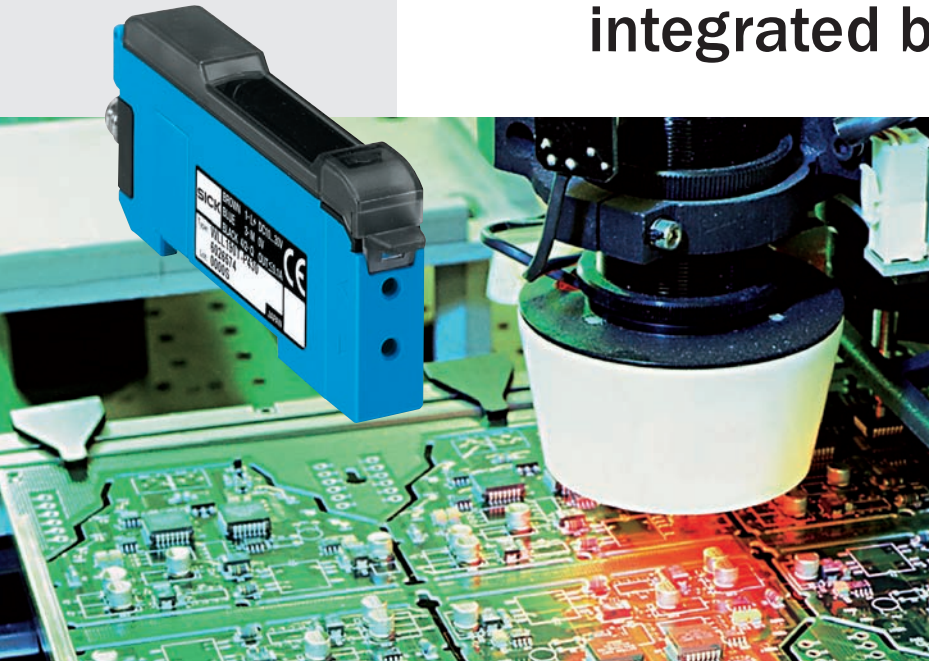
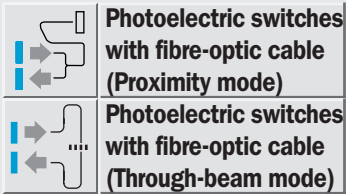


# WLL 190T – High-End Sensor for maximum scanning ranges, numeric displays, integrated bus



**T**he WLL 190T offers many new benefits and features. Together with the extended fibre-optic cable series LL 3 it provides clever, variable fibre-optic cable solutions.

## The highlights

### Maximum scanning ranges

Through-beam fibre-optic cable LL 3: up to 1.30 m (with tip adapters up to 5 m);

Fibre-optic cable sensor LL 3: up to 300 mm (90 % remission).

### Stable, reproducible switching point through Automatic Power Control (APC)

One like ALL: the sender diode is internally monitored and controlled. The uniform, factory-set

sensitivity means that the WLL 190T offers reproducible system sensitivity.

### Numeric displays, interactive prompts (monitoring)

The system parameters are defined by menu guidance. Online feedback: the current receiver values and the operating status are numerically displayed.

### Integrated system bus, ONE for all

There is no need for master/slave units. The benefits:

- 8 fold interference protection through automatic internal synchronisation,
- Wire saving; the supply voltage  $V_S$  DC 10 ... 30 V is required only once (less wiring),
- Double pre-processing.

Applications focus on the following industries:

- Semiconductor/electronic assembly,
- assembly and handling technology,
- special purpose machines,
- packaging industry.



▲ **WLL 190T – with integrated Bus technology**

WLL 190T Series sensors already have integrated Bus technology. There is no need for separate Master or Slave units. Two Bus options are available: **Software-** and **Hardware-Bus** systems. The choice of options are simply coded and activated via a Bus plug (3-pin for Software-Bus systems and 5-pin for Hardware-Bus systems).

The advantages are:

- Up to 16 WLL 190T can be cascaded together.
- 8-way interference suppression is automatically active.
- Access to all software options.
- Using a Hardware-Bus system reduces the amount of wiring needed.

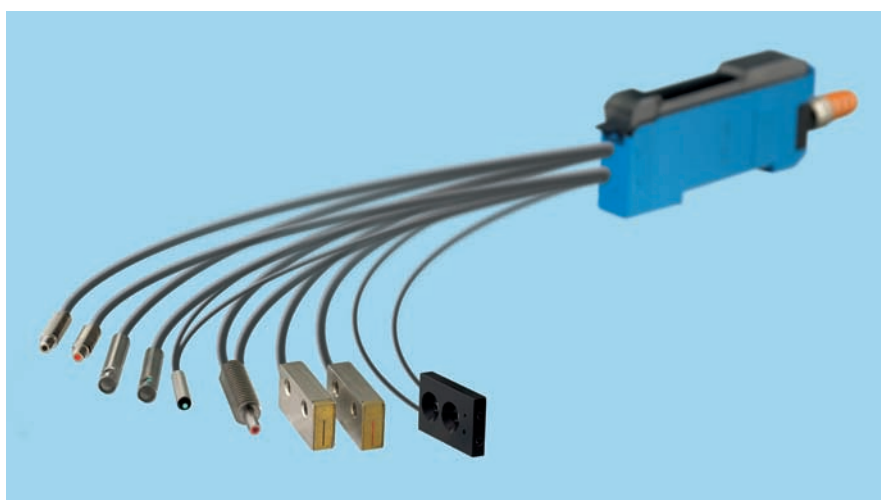
<i>nor</i>	“Normal” sensitivity
<i>GLAS</i>	Optimised for transparent objects, such as glass
<i>dyn</i>	Dynamic switching threshold
<i>Zone</i>	“Zone recognition” (window technology) for detecting marks
<i>APC</i>	APC – Automatic Power Control active
<i>cont</i>	Numeric counter function for setting the coincidence signal
<i>Func</i>	Functions: The entering of variable attributes of the unit, such as operating modes and response times
<i>SPEc</i>	Special features via the Software-Bus system: e.g. copying settings, Auto-0-Level

◀ **Software**

Securely and quickly programmed by pressing buttons and by menu guidance. The attributes of the unit and its parameters can be determined individually, directly on the sensor.

► **The WLL 190T fibre-optic cable photoelectric switch and the LL3 fibre-optic cable make a powerful team.**

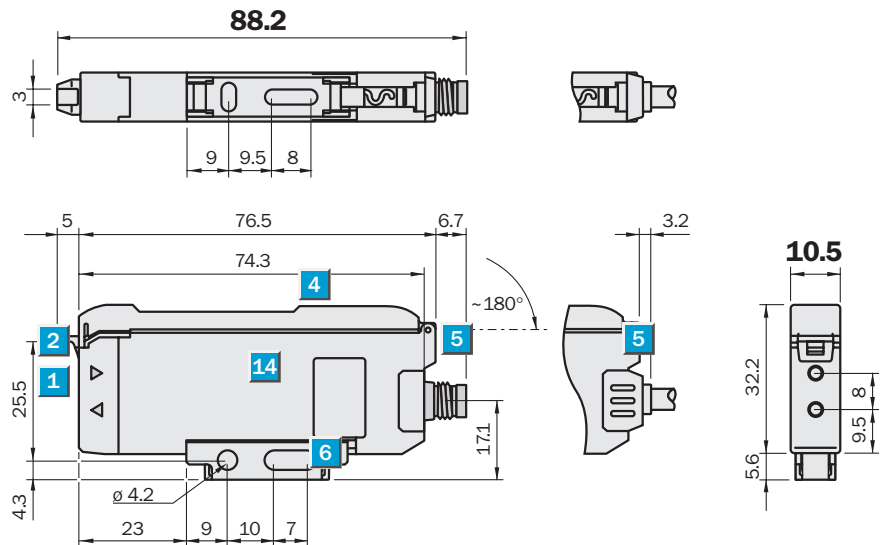
The properties and areas of application of the WLL 190T and LL3 complement each other. The fibre-optic cables of the LL3 Series are available in more than 80 options, ranging from universal to special purpose versions.



	<b>Scanning range</b> <b>1300 mm</b> <b>(5000 mm)</b>
<b>Through-beam system</b>	
	<b>Scanning distance</b> <b>300 mm</b>
<b>Proximity system</b>	

- LED red light
- Longest ranges
- Precise, stable switching point
- Numeric displays
- Interactive user prompting
- Appropriate for the LL 3 fibre-optic cable series

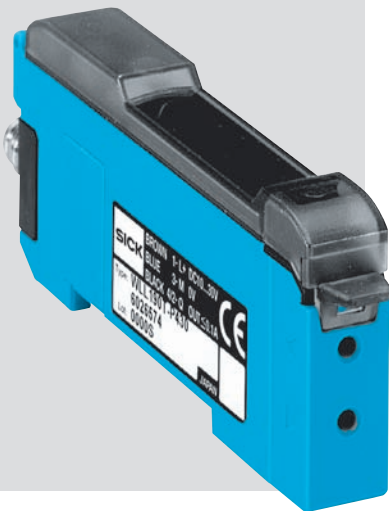
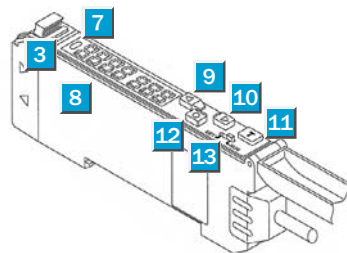
### Dimensional drawing



### Adjustments possible

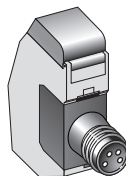
WLL 190T-P430	WLL 190T-N430
WLL 190T-P030	WLL 190T-N030
WLL 190T-P330	WLL 190T-N330

- 1 Sender LED, installation of LL 3 fibre-optic cable (sender fibre)
- 2 Receiver LED, installation of LL 3 fibre-optic cable (receiver fibre)
- 3 Locking of fibre-optic cables
- 4 Protective hood: can be folded out approx. 180°
- 5 M8 plug fixed or 1-wire cable or 3-wire cable replaceable (cables not included with delivery)
- 6 Mounting bracket included (see Accessories)
- 7 Indicator LED, yellow: lights up when switching output is active
- 8 Numeric display: 3-digit and 4-digit green: current reception value, operating mode red: Teach-in and function parameter
- 9 Step button > (manual switching threshold: higher; or next function parameter)
- 10 Step button < (manual switching threshold: lower; or previous function parameter)
- 11 "Teach-in" pushbutton
- 12 Mode/Enter button (programming button)
- 13 Operating mode selector switch: "SET": active Teach-in-switching threshold "RUN": sensor mode and function parameter selection
- 14 Protecting cap (on both sides). For "block installation" remove, take up for BUS plug

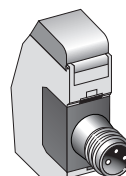


### Connection types

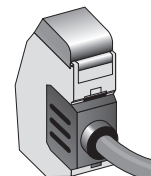
WLL 190T-P430	WLL 190T-P330	WLL 190T-P030
WLL 190T-N430	WLL 190T-N330	WLL 190T-N030



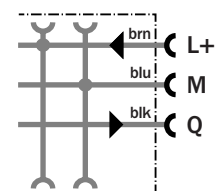
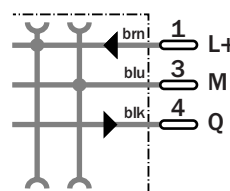
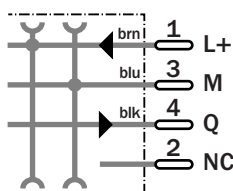
M8, 4-pin



M8, 3-pin



3-wire cable/1-wire cable



### See chapter Accessories

- Cables and connectors
- Mounting systems
- Fibre-optic cable

Technical data		WLL 190T-	P430	N430	P030	N030	P330	N330				
<b>Extras</b>	"One WLL 190T for EVERYTHING": No separate master/slave device required											
<b>LCD display</b>	3-digit and 4-digit numeric display Each additionally in red and green											
<b>Interactive user-prompting</b>	System options can be selected menu-prompted Sensitivity setting per Teach-in											
<b>Power indicator</b>	Reception signal and operating mode											
<b>Automatic Power Control</b>	System sensitivity standardized ex works Constant sender power, internal control											
<b>Internal BUS</b>	Block installation 16 x WLL 190T 8 x anti-interference 16 x wire-saving Internal signal processing of two WLL 190T											
<b>Single operation</b>	All performances available											
<b>Scanning range</b>	Depending on fibre-optic cable LL 3 used											
<b>Light source <sup>1)</sup>, light type</b>	LED sender red (650 nm)											
<b>Recommended operating range</b>	0 ... 1300 mm (through-beam system) (with auxiliary lens 0 ... 5000 mm) <sup>2)</sup>											
<b>Recommended operating distance <sup>3)</sup></b>	0 ... 300 mm <sup>1)</sup> (proximity system) <sup>2)</sup>											
<b>Sensitivity setting <sup>4)</sup></b>	5 optimization modes can be programmed Manual, per Teach-in button											
<b>Precise correction</b>	Step button >/< manual											
Light spot diameter LL 3	Depending on scanning range											
Dispersion angle fibre-optic cable LL3	Approx. 65° <sup>4)</sup>											
<b>Supply voltage V<sub>S</sub></b>	10 ... 30 V DC <sup>5)</sup>											
Residual ripple <sup>7)</sup>	≤ 10 %											
Current consumption <sup>8)</sup>	≤ 40 mA											
<b>Switching outputs</b>	Q: PNP Q: NPN											
<b>Output current I<sub>A</sub> max.</b>	≤ 100 mA											
<b>Switching type</b>	Dark-/light-switching selectable											
<b>Response time <sup>9)</sup></b>	Selectable: 0.4 ms/1 ms/4 ms											
<b>Switching frequency max. <sup>10)</sup></b>	1250/s; 500/s; 125/s											
<b>Time delay</b>	Programmable 0 ms ... 9000 ms											
Time type, programmable	OFF/T <sub>OFF</sub> /T <sub>ON</sub> /ONE-SHOT											
<b>Connection type</b> System coupling	Suitable cable coupling <sup>11)</sup> ; s. Accessories											
Plug	M8, 4-pin											
Plug	M8, 3-pin											
<b>VDE protection class</b>	□											
<b>Enclosure rating <sup>12)</sup></b>	IP 66											
<b>Circuit protection <sup>13)</sup></b>	A, B, C, D											
<b>Ambient temperature <sup>14)</sup></b>	Operation -25 °C ... +55 °C Storage -25 °C ... +70 °C											
<b>Weight</b> with system coupling	Approx. 20 g											
with M8 plug, 4-pin	Approx. 25 g											
with M8 plug, 3-pin	Approx. 25 g											
<b>Housing material</b>	ABS/PC											

<sup>1)</sup> Average service life 100,000 h at T<sub>A</sub> = +25 °C

<sup>2)</sup> Ranges/scanning distances at response time 4 ms. Range reduction at short response time (see LL 3/ WLL 190T Ranges Table)

<sup>3)</sup> Object with 90 % remission (based on standard white DIN 5033); 500 x 500 mm

<sup>4)</sup> Sensitivity setting  
The following optimization modes can be programmed

a) Normal mode (default) – 4 alternatives  
b) Dynamic Teach-in  
c) Zone Teach-in (window technology)  
d) Glass Teach-in (detection of transparent objects)

<sup>5)</sup> Deviations see LL 3 data

<sup>6)</sup> Limit values

<sup>7)</sup> May not exceed or fall short of V<sub>S</sub> tolerances

<sup>8)</sup> Without load

<sup>9)</sup> Signal transit time with resistive load



<sup>10)</sup> With light/dark ratio 1:1, without time delay

<sup>11)</sup> Do not bend cable below 0 °C

<sup>12)</sup> Only with correct adaptation of the LL 3 fibre-optic cable. Single-unit operation only. Optional BUS operation with side cover removed and BUS plugs contacted: IP 50

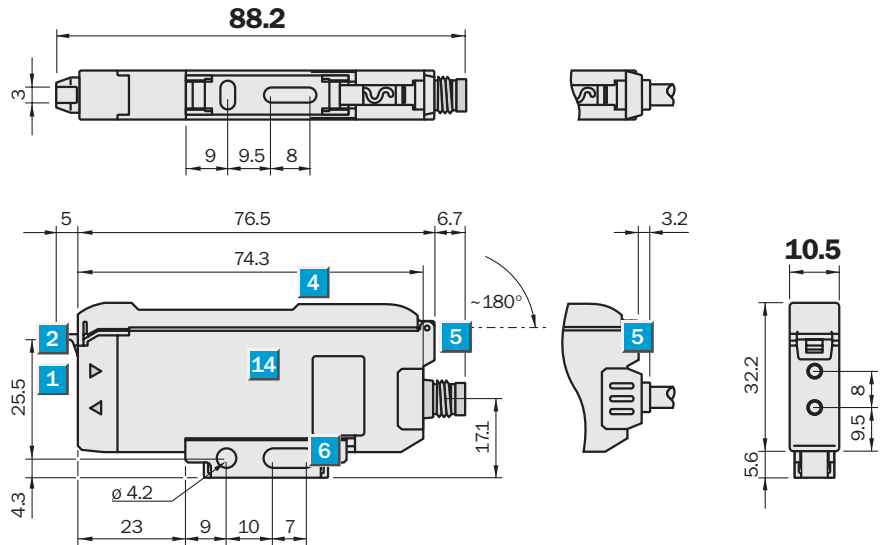
<sup>13)</sup> A = V<sub>S</sub> connections reverse-polarity protected  
B = Inputs/outputs reverse-polarity protected  
C = Interference pulse suppression  
D = Outputs overcurrent and short-circuit protected

<sup>14)</sup> Block installation of up to 3 switches: +55 °C  
Block installation of 4 ... 11 switches: +50 °C  
Block installation of more than 11 switches: +45 °C

	<b>Scanning range</b> 600 mm (3000 mm)
<b>Through-beam system</b>	
	<b>Scanning distance</b> 60 mm
<b>Proximity system</b>	

- LED green light
- For detection of marks
- Precise, stable switching point
- Numeric displays
- Interactive user prompting
- Appropriate for the LL 3 fibre-optic cable series

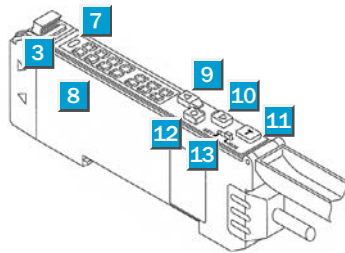
### Dimensional drawing



### Adjustments possible

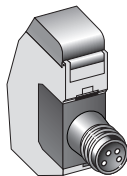
WLL 190T-P490	WLL 190T-N490
WLL 190T-P090	WLL 190T-N090
WLL 190T-P390	WLL 190T-N390

- 1 Sender LED, installation of LL 3 fibre-optic cable (sender fibre)
- 2 Receiver LED, installation of LL 3 fibre-optic cable (receiver fibre)
- 3 Locking of fibre-optic cables
- 4 Protective hood: can be folded out approx. 180°
- 5 M8 plug fixed or 1-wire cable or 3-wire cable replaceable (cables not included with delivery)
- 6 Mounting bracket included (see Accessories)
- 7 Indicator LED, yellow: lights up when switching output is active
- 8 Numeric display: 3-digit and 4-digit  
green: current reception value, operating mode  
red: Teach-in and function parameter
- 9 Step button > (manual switching threshold: higher; or next function parameter)
- 10 Step button < (manual switching threshold: lower; or previous function parameter)
- 11 "Teach-in" pushbutton
- 12 Mode/Enter button (programming button)
- 13 Operating mode selector switch:  
"SET": active Teach-in-switching threshold  
"RUN": sensor mode and function parameter selection
- 14 Protecting cap (on both sides). For "block installation" remove, take up for BUS plug

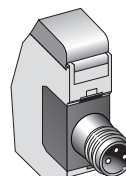


### Connection types

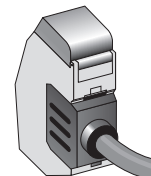
WLL 190T-P490	WLL 190T-P390	WLL 190T-P090
WLL 190T-N490	WLL 190T-N390	WLL 190T-N090



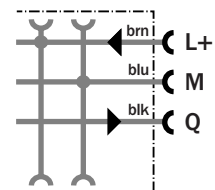
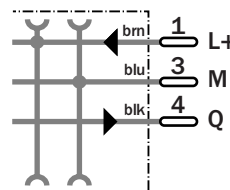
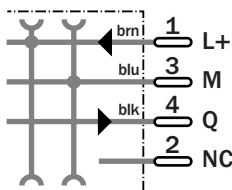
M8, 4-pin



M8, 3-pin



3-wire cable/1-wire cable



### See chapter Accessories

- Cables and connectors
- Mounting systems
- Fibre-optic cable



Technical data		WLL 190T-	P490	N490	P090	N090	P390	N390				
<b>Extras</b>	"One WLL 190T for EVERYTHING": No separate master/slave device required											
<b>LCD display</b>	3-digit and 4-digit numeric display Each additionally in red and green											
<b>Interactive user-prompting</b>	System options can be selected menu-prompted Sensitivity setting per Teach-in											
<b>Power indicator</b>	Reception signal and operating mode											
<b>Automatic Power Control</b>	System sensitivity standardized ex works Constant sender power, internal control											
<b>Internal BUS</b>	Block installation 16 x WLL 190T 8 x anti-interference 16 x wire-saving Internal signal processing of two WLL 190T											
<b>Single operation</b>	All performances available											
<b>Scanning range</b>	Depending on fibre-optic cable LL 3 used											
<b>Light source <sup>1)</sup>, light type</b>	LED sender green (525 nm)											
<b>Recommended operating range</b>	0 ... 600 mm (through-beam system) (with auxiliary lens 0 ... 3000 mm) <sup>2)</sup>											
<b>Recommended operating distance<sup>3)</sup></b>	0 ... 60 mm <sup>1)</sup> (proximity system) <sup>2)</sup>											
<b>Sensitivity setting <sup>4)</sup></b>	5 optimization modes can be programmed Manual, per Teach-in button											
<b>Precise correction</b>	Step button >/< manual											
Light spot diameter LL 3	Depending on scanning range											
Dispersion angle fibre-optic cable LL3	Approx. 65° <sup>5)</sup>											
<b>Supply voltage V<sub>S</sub></b>	10 ... 30 V DC <sup>6)</sup>											
Residual ripple <sup>7)</sup>	≤ 10 %											
Current consumption <sup>8)</sup>	≤ 40 mA											
<b>Switching outputs</b>	Q: PNP Q: NPN											
<b>Output current I<sub>A</sub> max.</b>	≤ 100 mA											
<b>Switching type</b>	Dark-/light-switching selectable											
<b>Response time <sup>9)</sup></b>	Selectable: 0.4 ms/1 ms/4 ms											
<b>Switching frequency max. <sup>10)</sup></b>	1250/s; 500/s; 125/s											
<b>Time delay</b>	Programmable 0 ms ... 9000 ms											
Time type, programmable	OFF/T <sub>OFF</sub> /T <sub>ON</sub> /ONE-SHOT											
<b>Connection type</b> System coupling	Suitable cable coupling <sup>11)</sup> ; s. Accessories											
Plug	M8, 4-pin											
Plug	M8, 3-pin											
<b>VDE protection class</b>	□											
<b>Enclosure rating <sup>12)</sup></b>	IP 66											
<b>Circuit protection <sup>13)</sup></b>	A, B, C, D											
<b>Ambient temperature <sup>14)</sup></b>	Operation -25 °C ... +55 °C Storage -25 °C ... +70 °C											
<b>Weight</b> with system coupling	Approx. 20 g											
with M8 plug, 4-pin	Approx. 25 g											
with M8 plug, 3-pin	Approx. 25 g											
<b>Housing material</b>	ABS/PC											

<sup>1)</sup> Average service life 100,000 h at T<sub>A</sub> = +25 °C

<sup>2)</sup> Ranges/scanning distances at response time 4 ms. Range reduction at short response time (see LL 3/ WLL 190T Ranges Table)

<sup>3)</sup> Object with 90 % remission (based on standard white DIN 5033); 500 x 500 mm

<sup>4)</sup> Sensitivity setting

The following optimization modes can be programmed

a) Normal mode (default) – 4 alternatives  
b) Dynamic Teach-in  
c) Zone Teach-in (window technology)  
d) Glass Teach-in (detection of transparent objects)

<sup>5)</sup> Deviations see LL 3 data

<sup>6)</sup> Limit values

<sup>7)</sup> May not exceed or fall short of V<sub>S</sub> tolerances

<sup>8)</sup> Without load

<sup>9)</sup> Signal transit time with resistive load

<sup>10)</sup> With light/dark ratio 1:1, without time delay

<sup>11)</sup> Do not bend cable below 0 °C

<sup>12)</sup> Only with correct adaptation of the LL 3 fibre-optic cable. Single-unit operation only. Optional BUS operation with side cover removed and BUS plugs contacted: IP 50

<sup>13)</sup> A = V<sub>S</sub> connections reverse-polarity protected

B = Inputs/outputs reverse-polarity protected

C = Interference pulse suppression

D = Outputs overcurrent and short-circuit protected

<sup>14)</sup> Block installation of up to 3 switches: +55 °C

Block installation of 4 ... 11 switches: +50 °C

Block installation of more than 11 switches: +45 °C

# The WLL 190T System-bus – modules and accessories

WLL 190T already has the Bus-system integrated within it.

It is activated via a coded plug. There are no separate Master or Slave units needed, or programming tools of any kind. Two optional Bus-systems with staggered features can be chosen for each individual Bus-plug.

## WLL 190T – Solo the HIGH LIGHTS

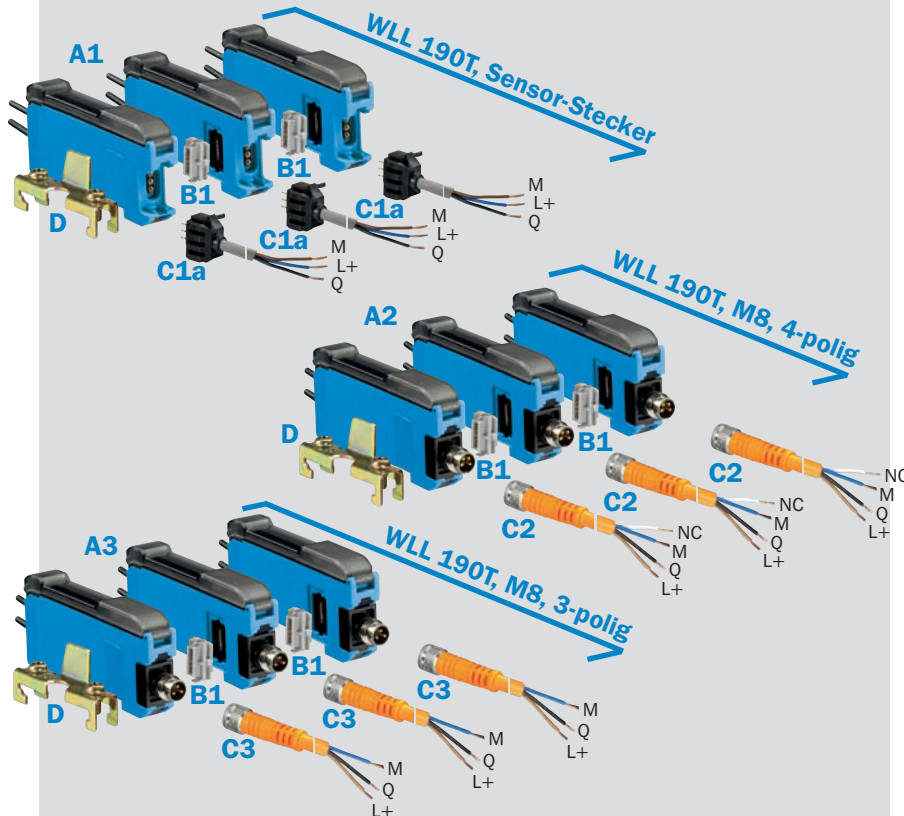
The WLL 190T “Solo Unit” already offers significantly enhanced system data:

- **Much greater ranges (~2 ... 3 x WLL 170T)**  
Proximity system max. 1,300 mm (5,000 mm); Throughbeam system max. 300 mm
- **Simple, variable adjustment of the sensitivity setting**
- **ONE UNIT** for all requirements, due to freely selectable function settings
- **Monitoring**, i.e. numeric displays provide information and offer menu-guided programming
- **ONE UNIT** for all requirements, due to APC – Automatic Power Control. The constant transmission of data provides stabilised switching threshold levels
- **Enclosure rating IP 66** as a single stand-alone WLL 190T unit



## The WLL 190T Software-Bus provided by a 3-pin Bus plug

- Access to further software functions
- Automatic 8-way interference suppression



The Software-Bus components (optionally up to 16 x WLL 190T units)  
 A: Sensor A1 or A2 or A3. We recommend that A1, A2 and A3 are not mixed together in a general structured arrangement.  
 B: Bus-plug, 3-pin (grey), only B1  
 C: Cable receptacle only C1, C2 or C3  
 D: End pieces, two

## Selection of WLL 190 Bus-components

### A WLL 190T Connection technology

<b>A1</b>	Sensor type WLL 190T, sensor plugs Accessories: C1a and C1b
	WLL 190T-P030, PNP, LED red, order no. 6 026 572
	WLL 190T-N030, NPN, LED red, order no. 6 026 573
	WLL 190T-P090, PNP, LED green, order no. 6 026 585
	WLL 190T-N090, NPN, LED green, order no. 6 026 586

<b>A2</b>	Sensor type WLL 190T, M8, 4-pin Accessories: C2
	WLL 190T-P430, PNP, LED red, order no. 6 026 574
	WLL 190T-N430, NPN, LED red, order no. 6 026 575
	WLL 190T-P490, PNP, LED green, order no. 6 026 587
	WLL 190T-N490, NPN, LED green, order no. 6 026 588

<b>A3</b>	Sensor type WLL 190T, M8, 3-pin Accessories: C3
	WLL 190T-P330, PNP, LED red, order no. 6 026 576
	WLL 190T-N330, NPN, LED red, order no. 6 026 577
	WLL 190T-P390, PNP, LED green, order no. 6 026 589
	WLL 190T-N390, NPN, LED green, order no. 6 026 590

### B Bus-plug

<b>B1</b>	Bus-plug, 3-pin, only for Software Bus
	STE-WLL190-03P order no. 6 026 581
<b>B2</b>	Bus-plug, 5-pin, only for Hardware Bus
	STE-WLL190-05P *) order no. 6 026 580

\*) included in the “scope of supply” of cable receptacles C1b



## “Wire-Saving” for a significant reduction in wiring due to the WLL 190T Hardware-Bus system

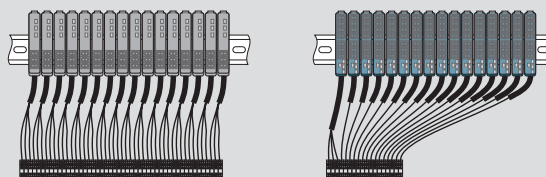
- The  $V_S$  voltage supply is only fed by a 3-core connecting cable (Master).
- Additional units (up to 15 x WLL 190T units) are connected via a single-core connecting cable (Slaves). This means only the Q output circuit is connected.
- All software options are also available.

### Example of wire reduction:

16 conventionally wired photoelectric switches require 48 terminal connections.

16 wired WLL 190T units only need 18 terminal connections.

**Savings: 30 terminals and associated wiring.**



## WLL 190T Accessories

### C Cable receptacles

#### C1a For A1: $U_V + Q$ , 3-core cable, WLL 190T sensor plug

DOL-LL1903-02M, cable length 2 m, order no. 6 026 578

DOL-LL1903-05M, cable length 5 m, order no. 6 028 379

#### C1b For A1: Q, single-core, WLL 190T sensor plug (only Wire-Saving)

DOL-LL1901-02M \*\*, cable length 2 m, order no. 6 026 579

DOL-LL1901-05M \*\*, cable length 5 m, order no. 6 028 380

#### C2 For A2: $U_V + Q$ , 4-core, M8, 4-pin

DOL-0804-G02M, cable length 2 m, order no. 6 009 870

DOL-0804-G05M, cable length 5 m, order no. 6 009 872

#### C3 For A3: $U_V + Q$ , 3-core, M8, 3-pin

DOL-0803-G02M, cable length 2 m, order no. 6 010 785

DOL-0803-G05M, cable length 5 m, order no. 6 022 009

### D End pieces

#### D End pieces for mounting profile rail assembly

BF-EB01-W190 order no. 5 313 011

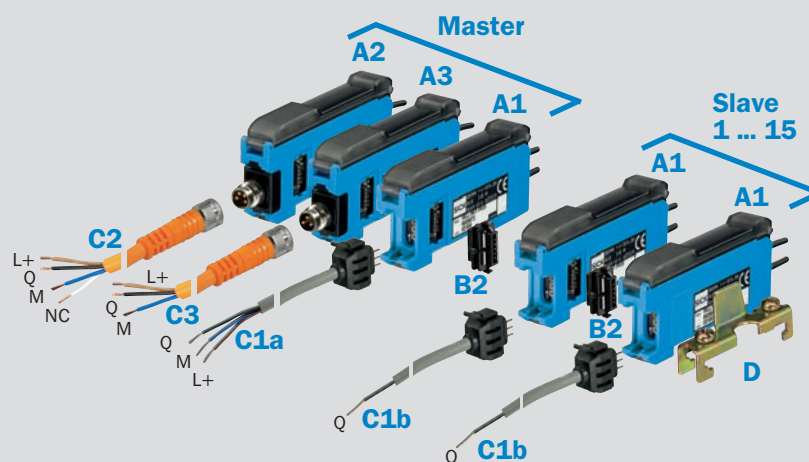
#### Please note:

- Do not mix 3-pin Bus-plug with 5-pin Bus-plugs
- Do not connect WLL 190T Bus components whilst electrically powered

\*\*) included in the “scope of supply”: 5-pin Bus-plug (B2)

## WLL 190T Hardware-Bus by means of 5-pin bus plug.

- “Wire-Saving” – considerable reduction in cost and effort in electrical wiring.
- All options of the Software-Bus available..



The Hardware-Bus components

A: Master sensor, max. one sensor, either A1 or A2 or A3.

Cable receptacles C1a, C2 or C3.

Slave sensors, max. 15, only A1 with C1b cable receptacles.

B: Bus-plug, 5-pin (black), only B2

D: End pieces, two