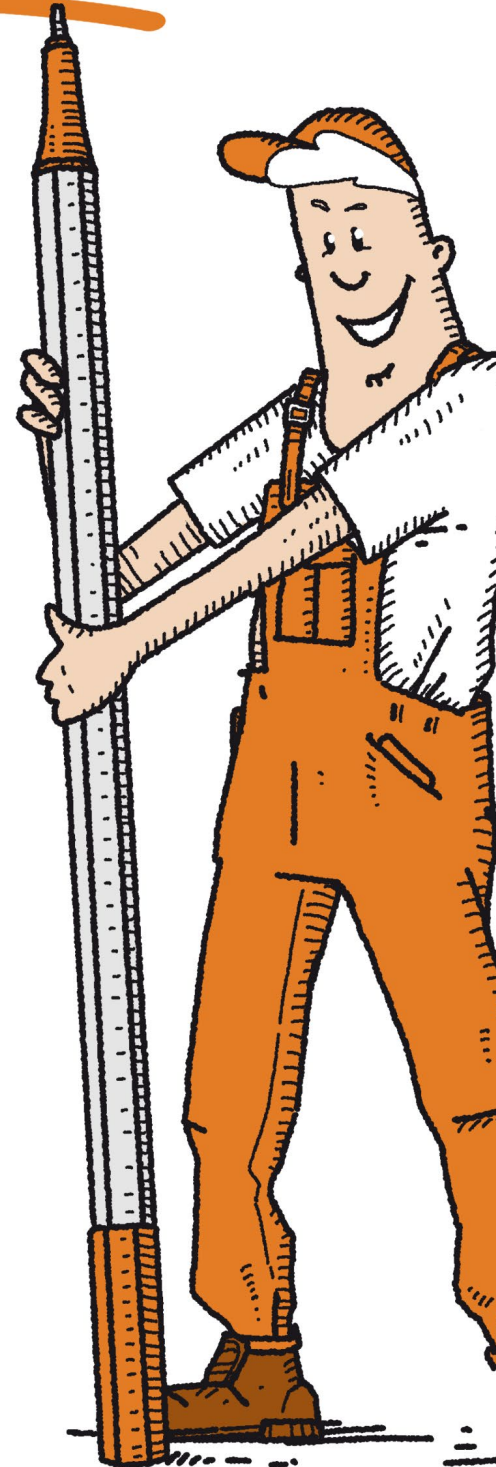
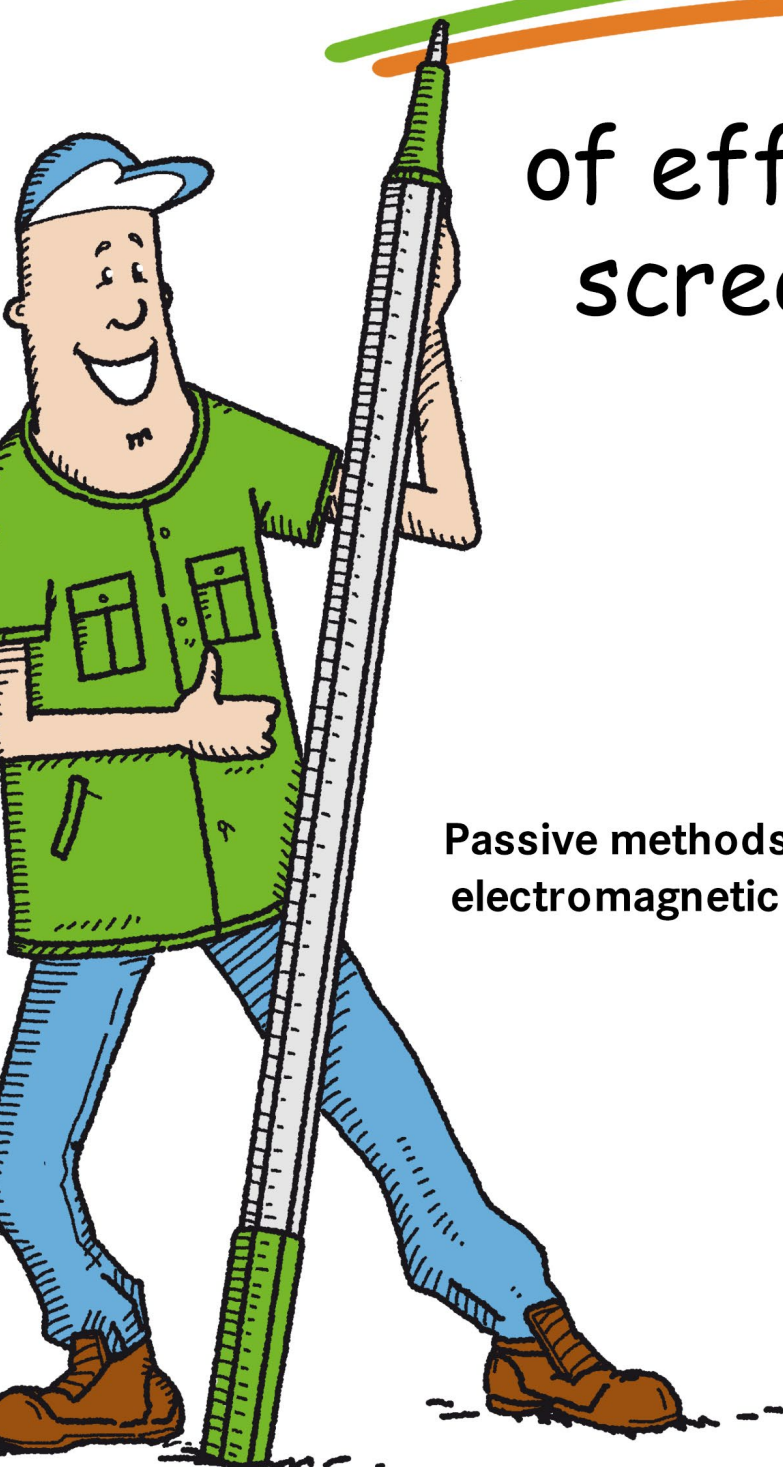




The Handbook

of efficient
screening

Passive methods of providing
electromagnetic compatibility





EMC
ELECTROMAGNETIC COMPATIBILITY

Dear Colleagues **Electricians** **and Automation Engineers**

We are specialists, just like You. We like practical tips and solutions, we do not reinvent the wheel. We do not like too complicated theories, formulas, integrals, differentials etc. (not because we are unable to calculate it but because sometimes we simply do not have enough time for it). Currently we are working for producers of electrotechnical devices and automatics, where we accommodate with knowledge and experience. Everyday we answer your questions and questions from our colleagues from the company. Everyday we deal with issues connected with electromagnetic compatibility (EMC):

- How to screen?
- What should be used for screening?
- How to plan cable routes?
- How to ground screens?

These are only a few examples of interest of our interlocutors or email recipients. That is the reason why during one of our trainings we came up with an idea of gathering our extensive knowledge and experience in one place. To add practical tips and- after a reliable and thorough verification done by the world of science- publish in the form of a handbook.

Today we give you the results of work created by engineers and artist, who combined the tips into comic story. We hope that it will be interesting for you and after getting to know the content you will be able to solve more than one problem connected with screening. In the later section of the handbook you will find the table with all the tips and a few pages further a few products that may be useful during your daily work with screened cables.

At the same time we have to stipulate that regardless of our trying to do our best while writing this handbook we cannot take responsibility for the results of your work - for sure you will understand us!

We send our best regards to all of you who want to work better with our handbook.

Henryk Ziegler
WAGO ELWAG Sp. z o. o.
emc.pl@wago.com

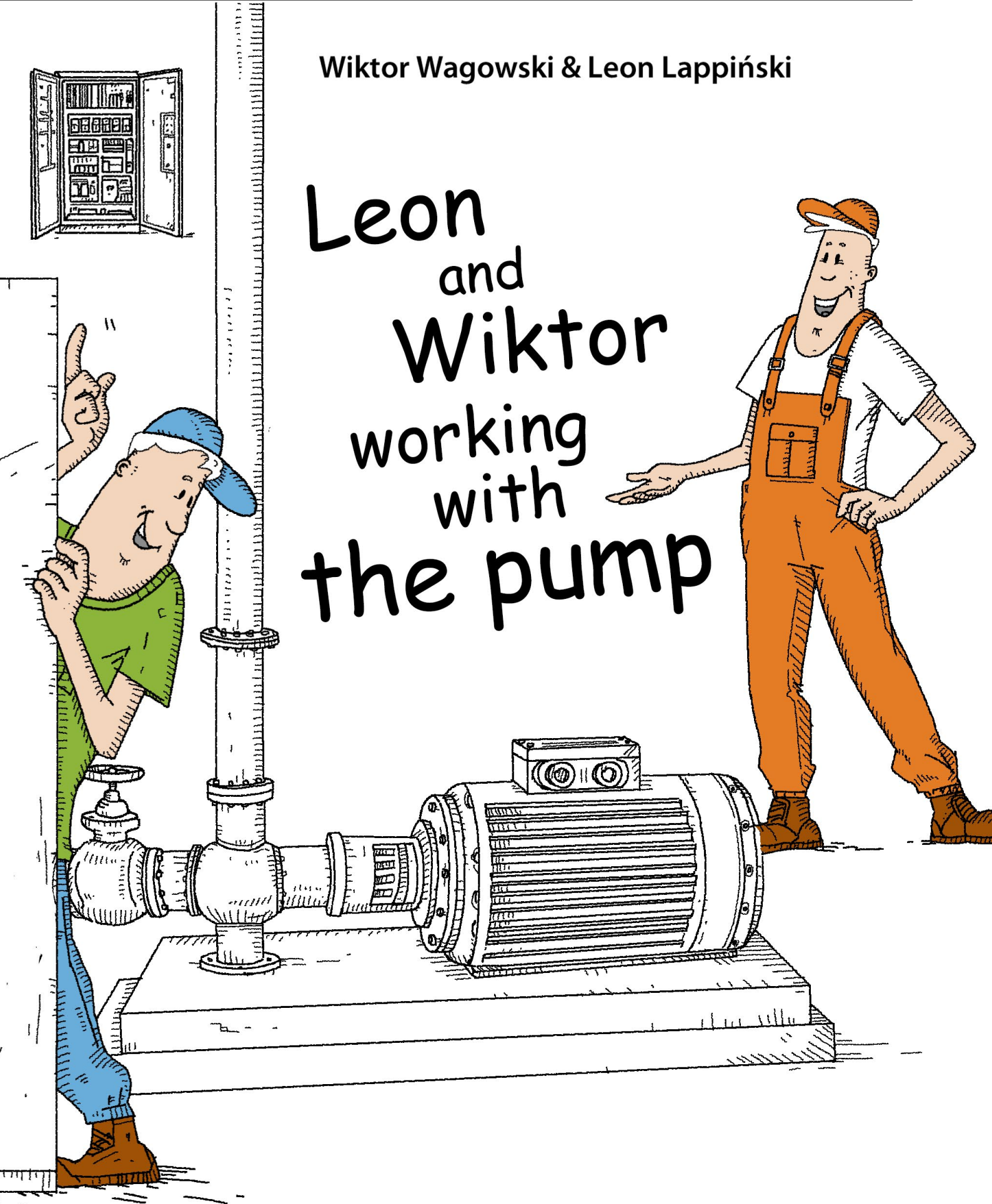
Mariusz Pajkowski
LAPP KABEL Sp. z o. o.
emc.pl@lappolska.pl

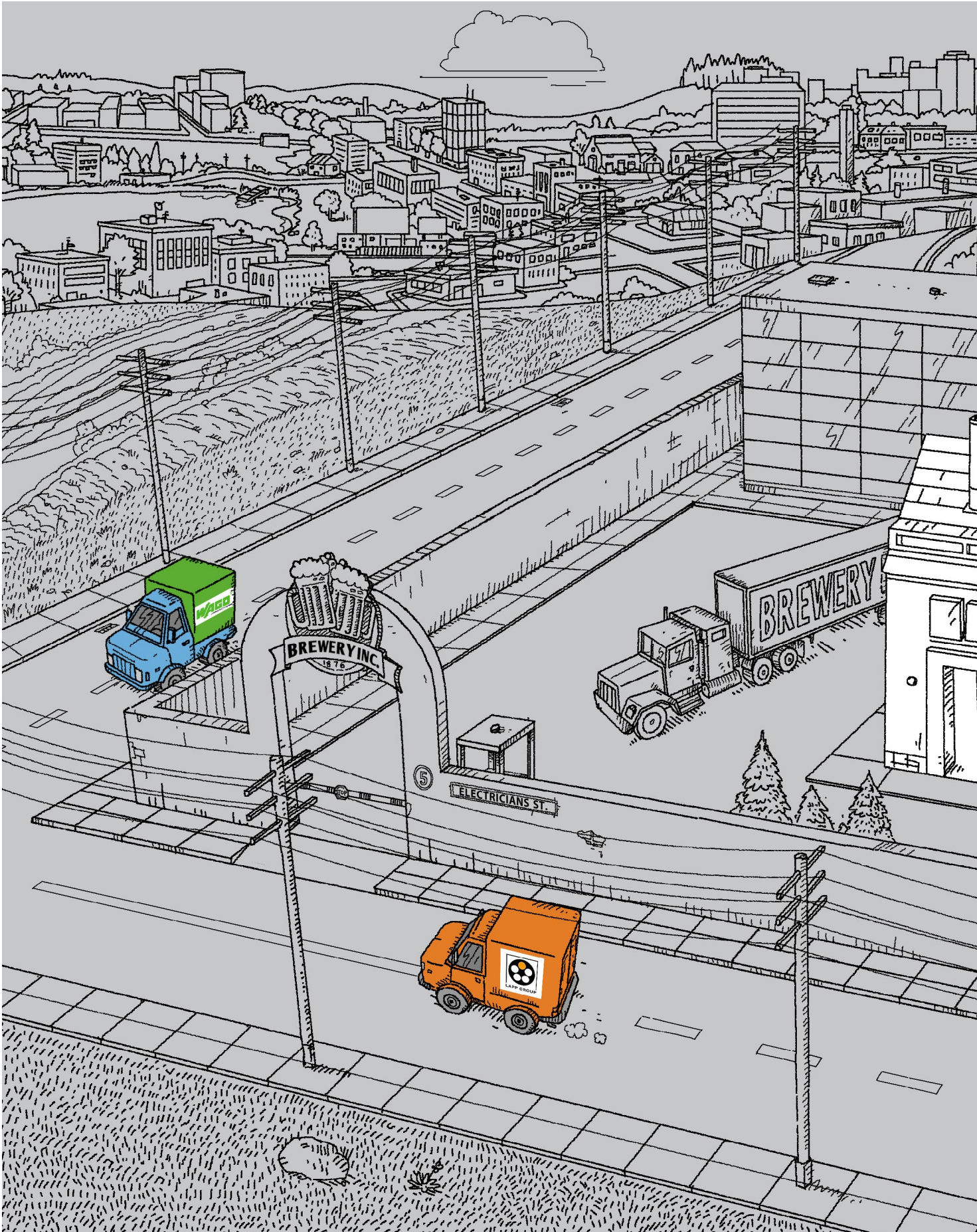
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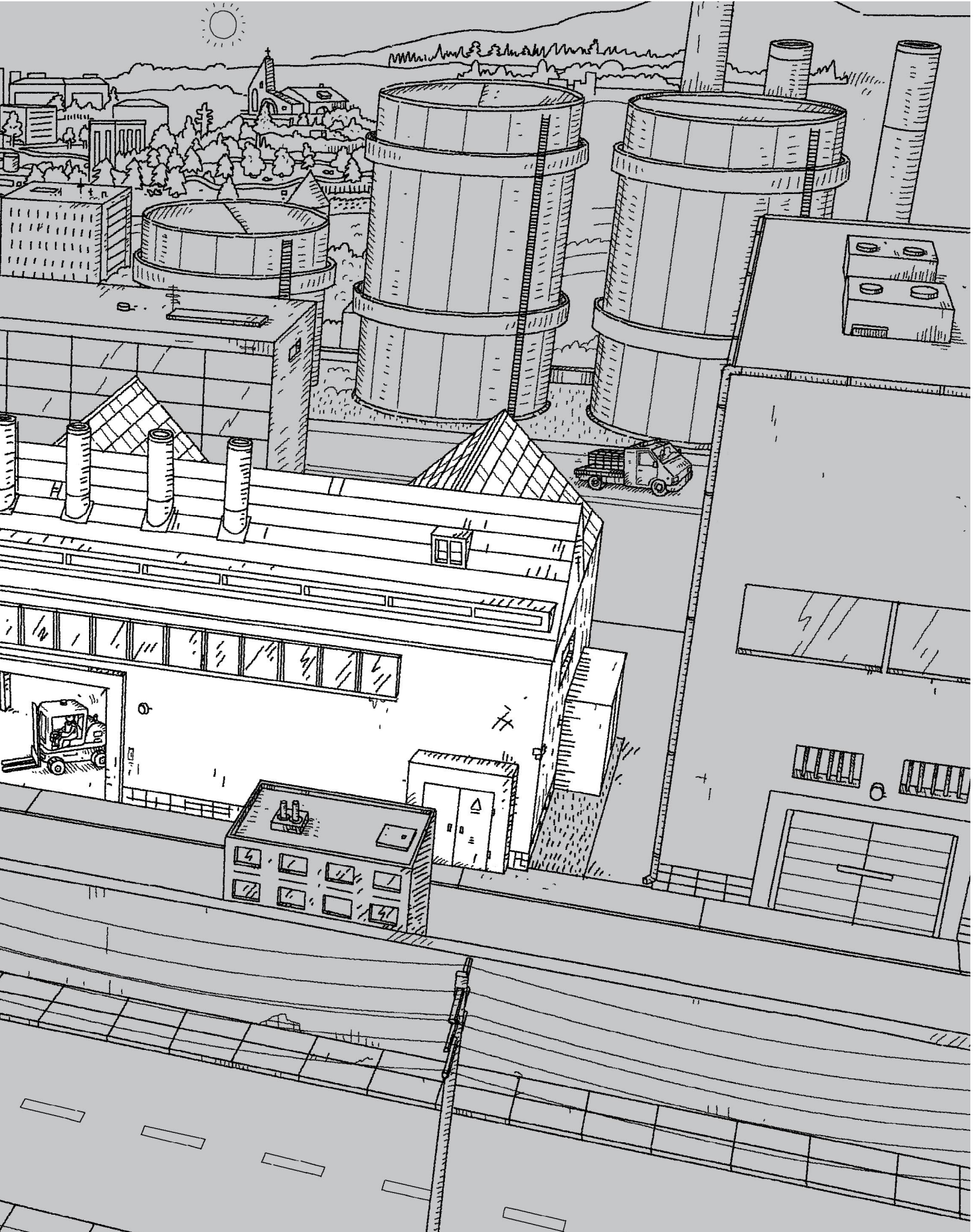
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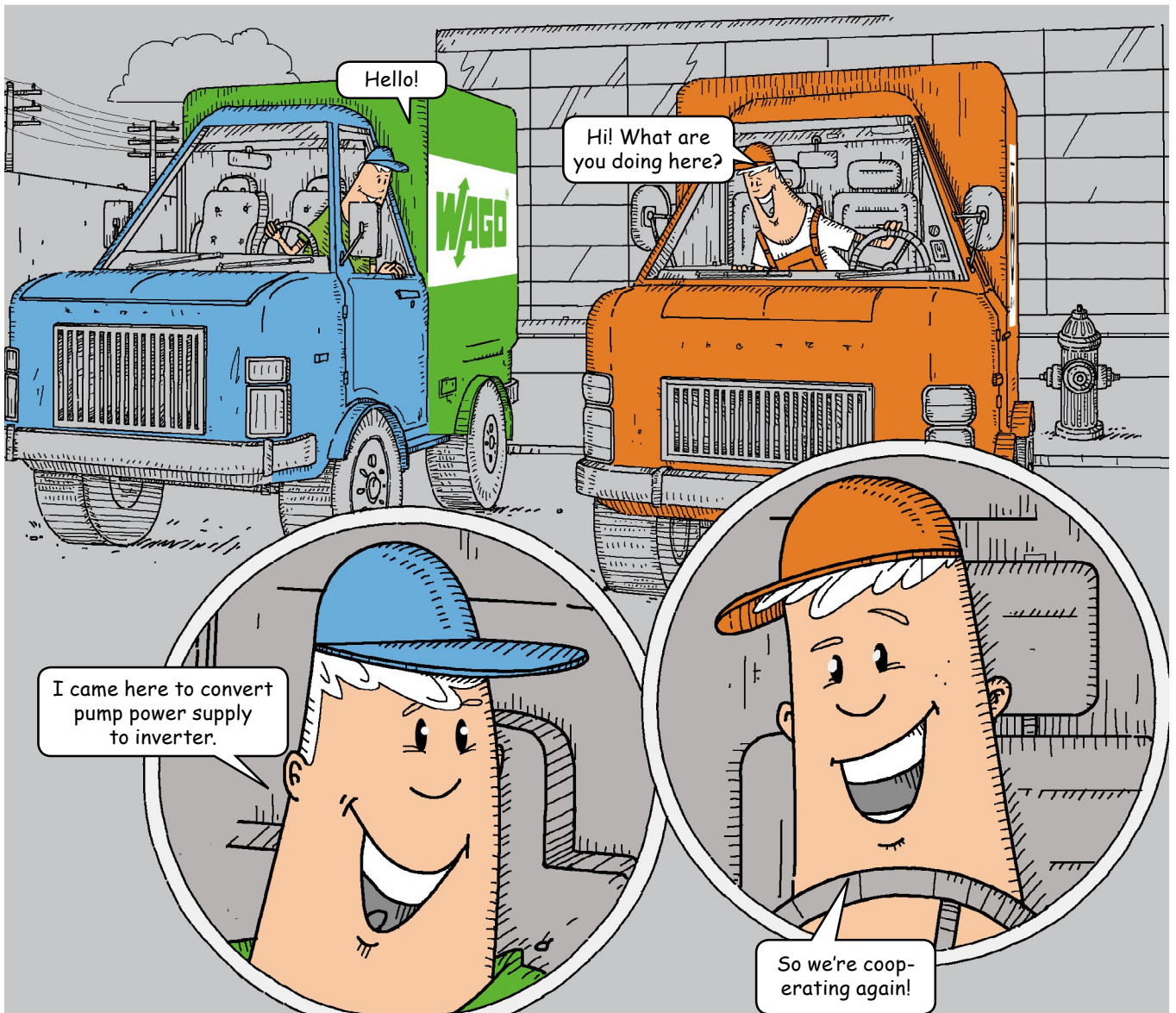
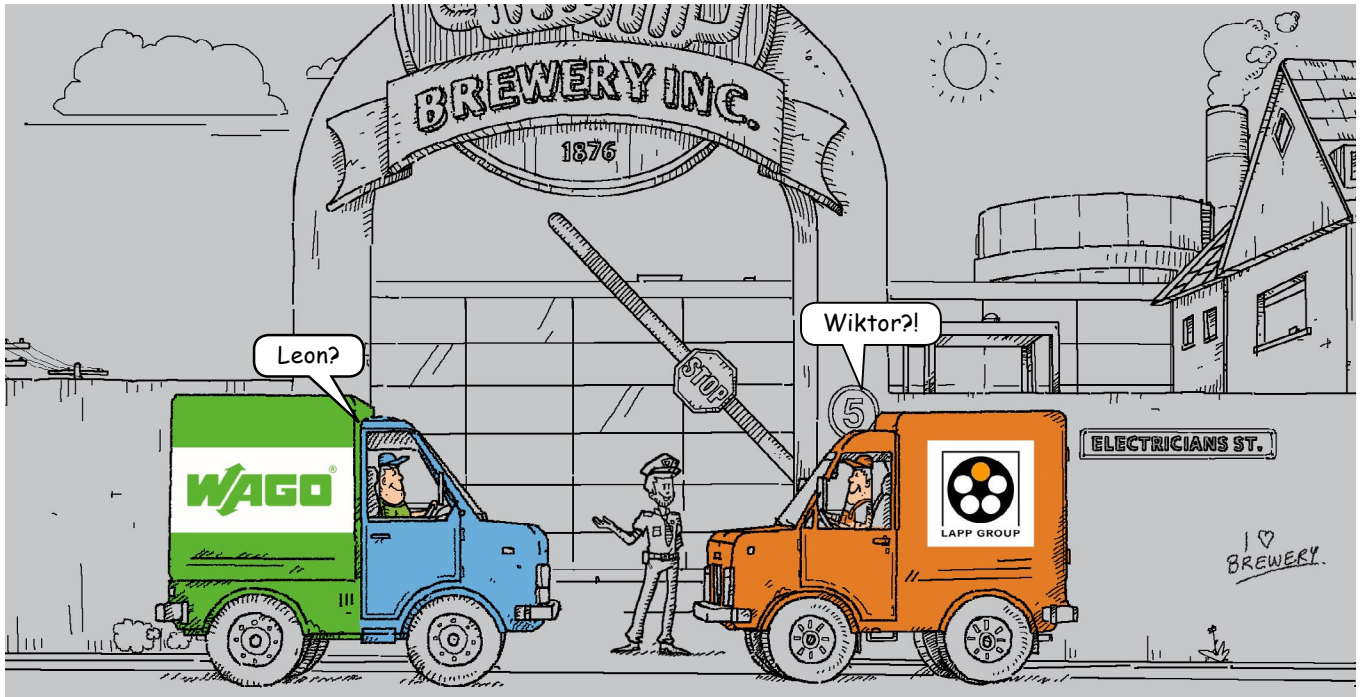
Wiktor Wagowski & Leon Lappiński

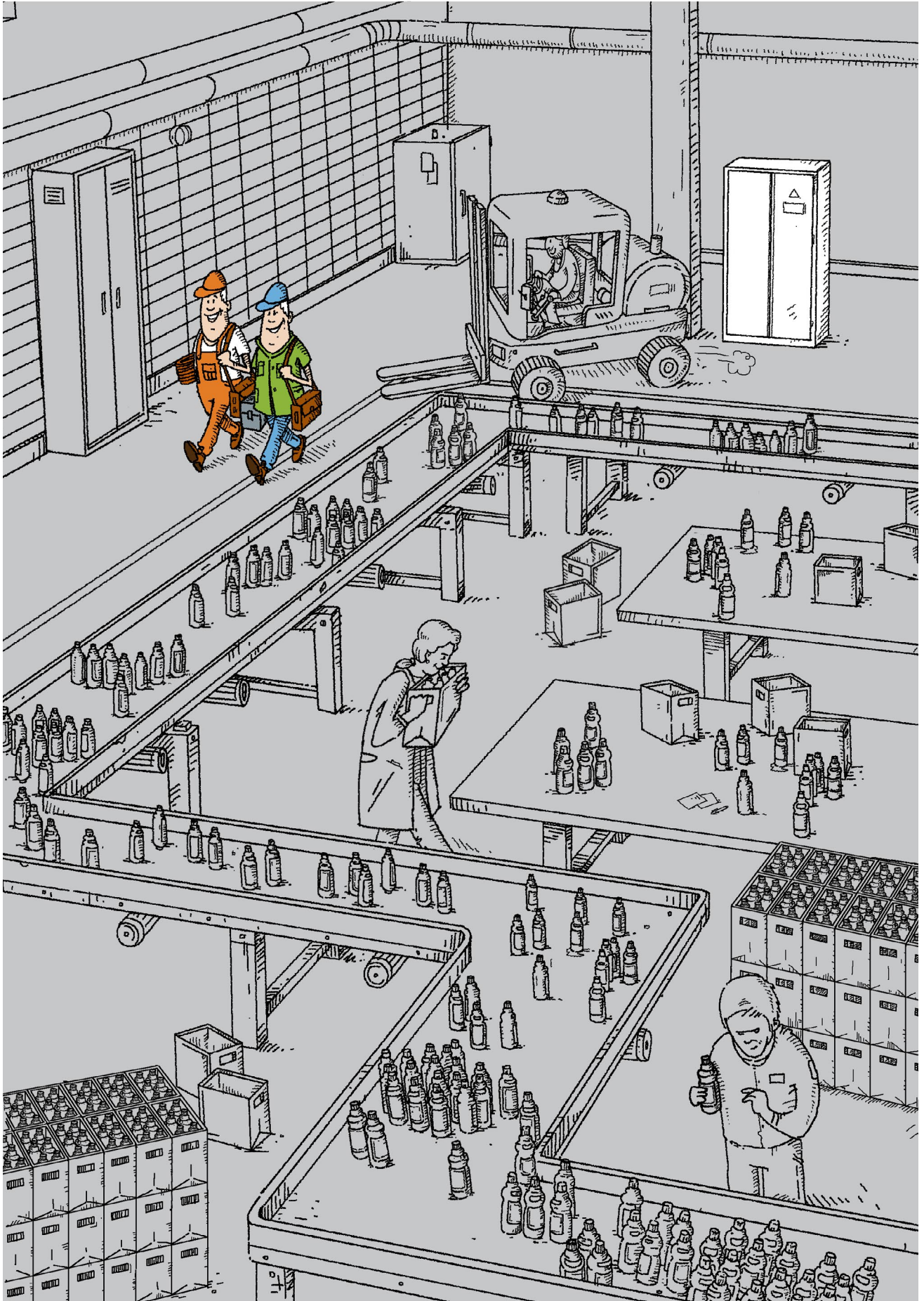
Leon and Wiktor working with the pump











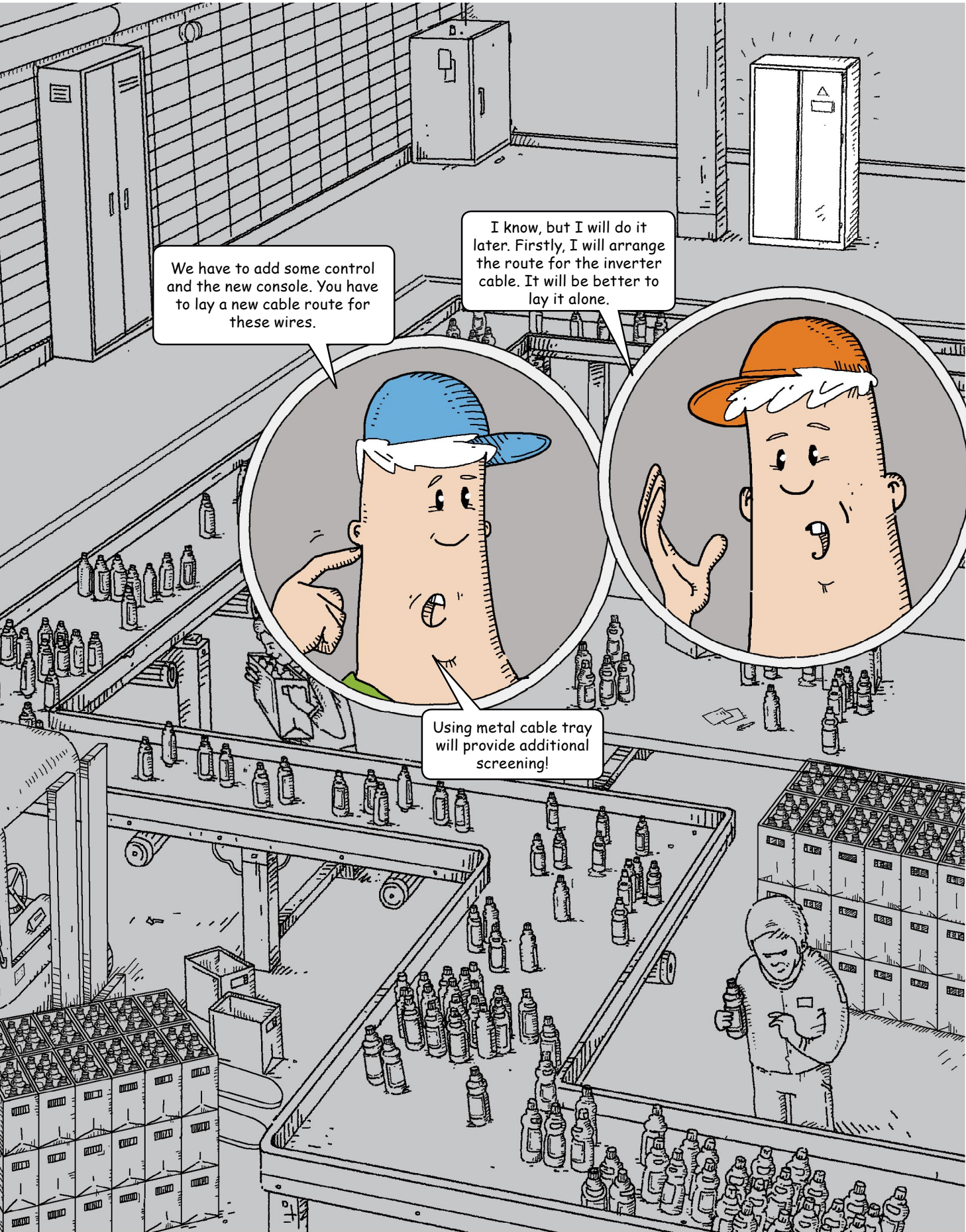
Leon and Wiktor working with the pump



This pump is quite big- see- engine 22kW

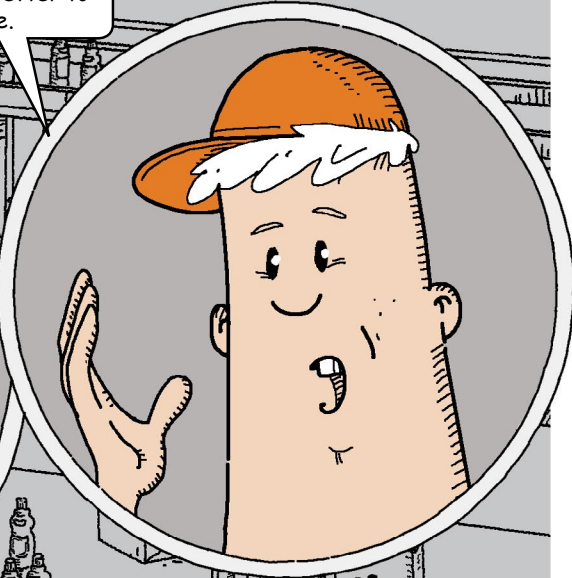
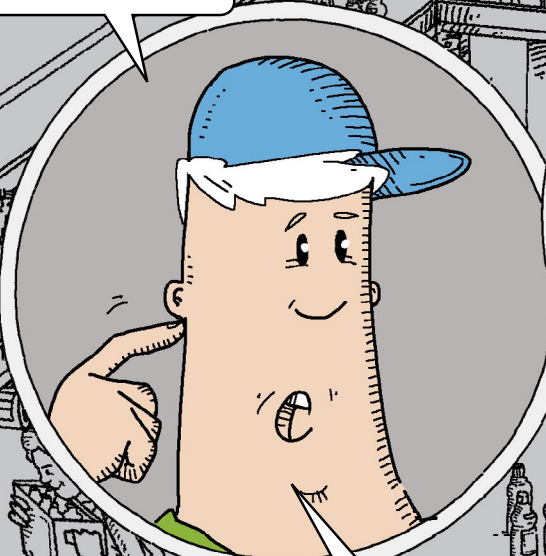
That is why they're converting it. It will save a lot of energy. The converter will pay the cost back in two years.

Control cabinet is quite far. I have to check carefully how many meters it is. Choosing proper screened cable depends on that.

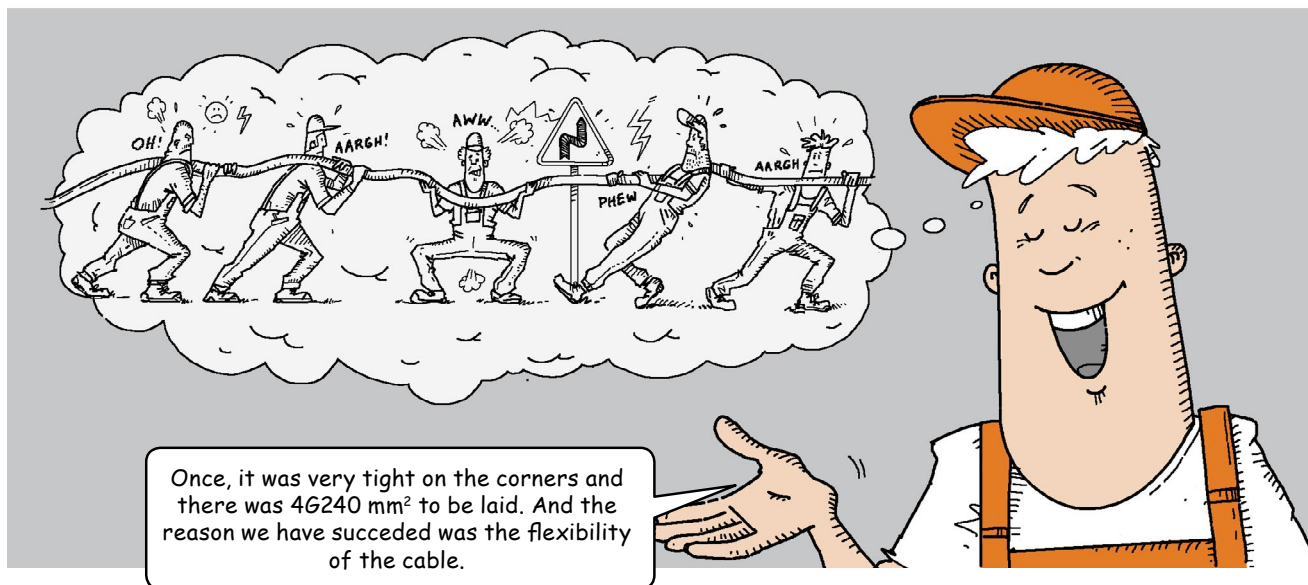
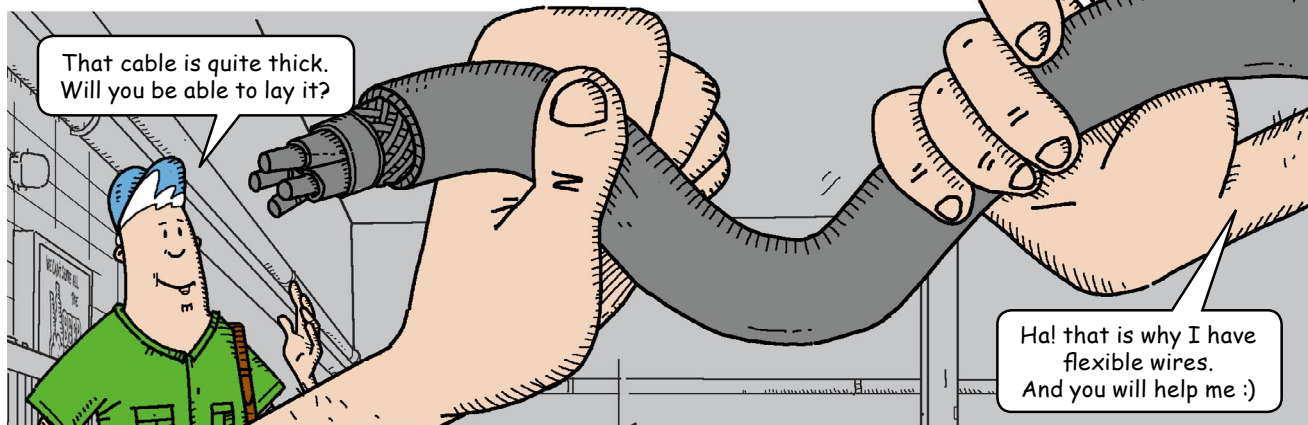
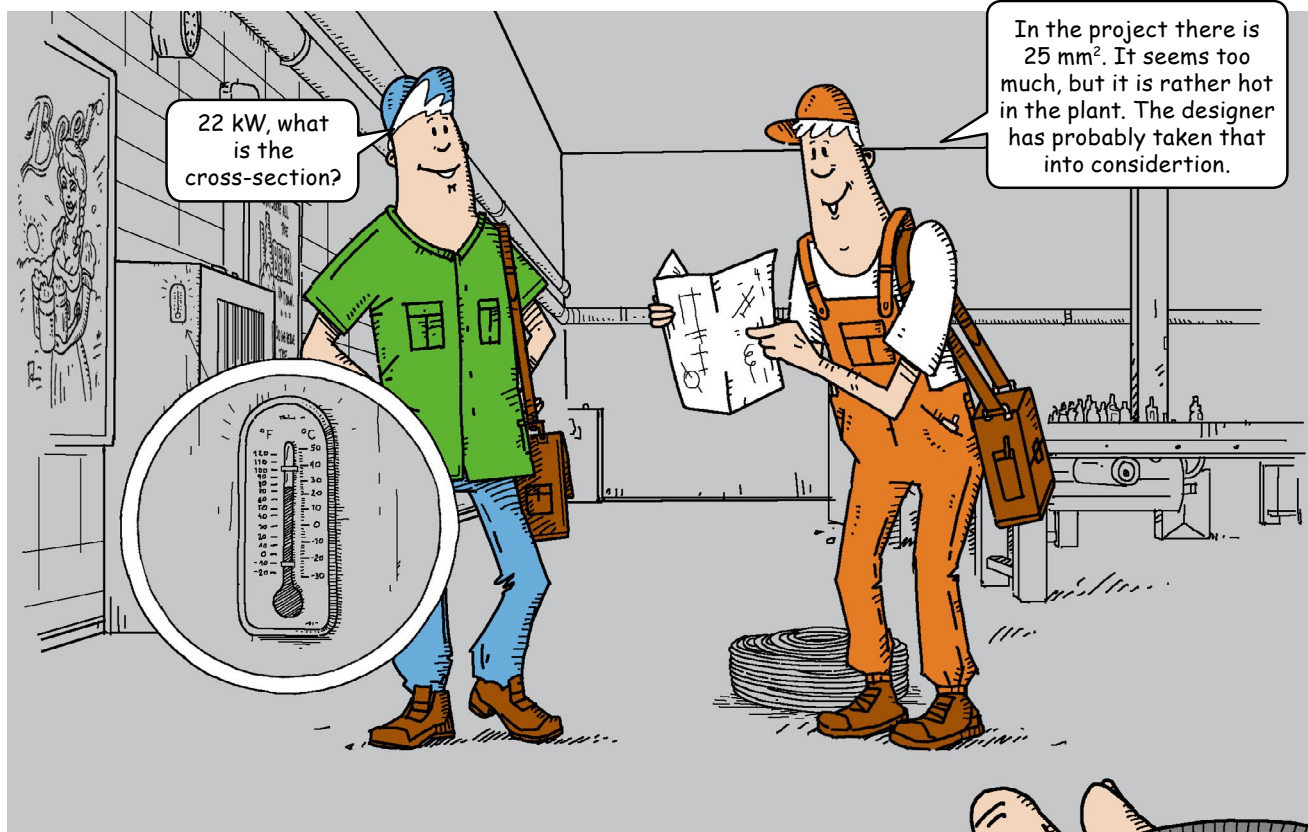


We have to add some control and the new console. You have to lay a new cable route for these wires.

I know, but I will do it later. Firstly, I will arrange the route for the inverter cable. It will be better to lay it alone.



Using metal cable tray will provide additional screening!

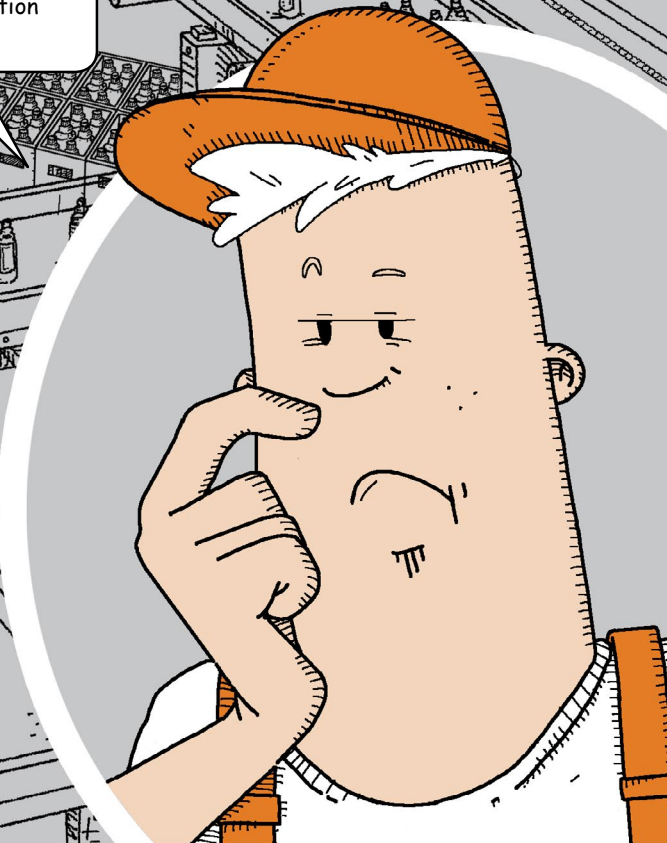


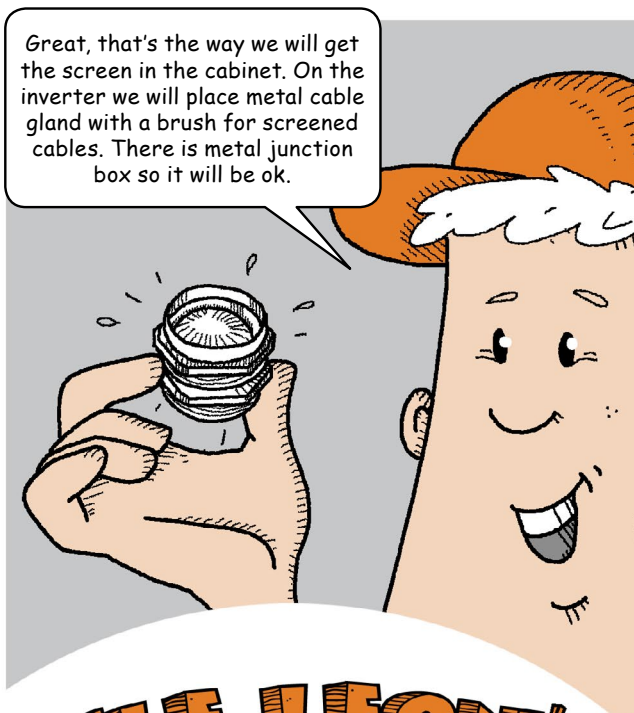
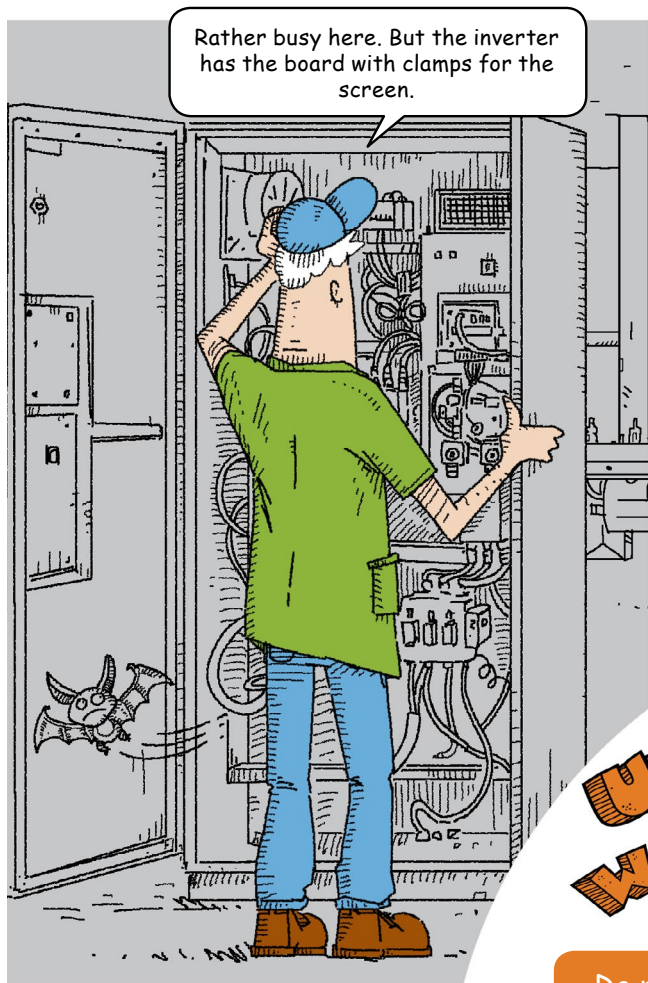
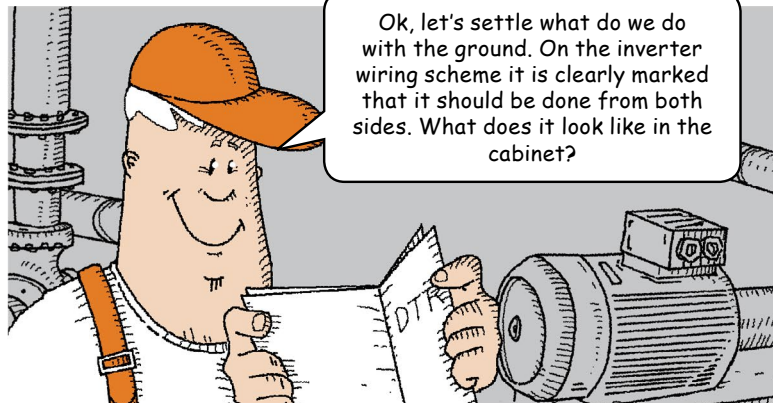
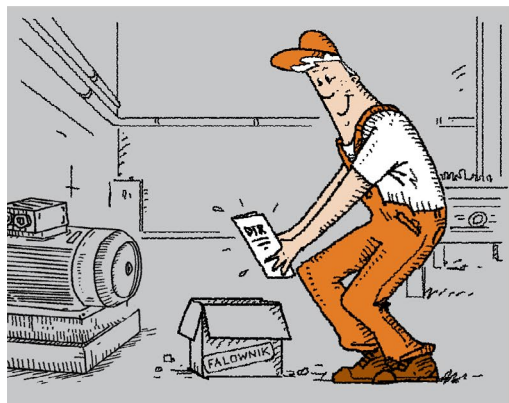


I have measured it, 70 m. Quite a lot.

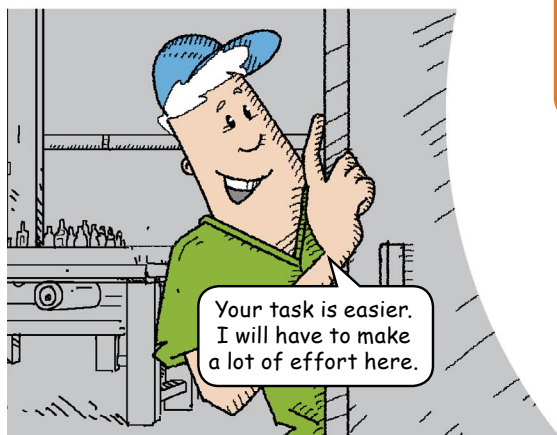
I have heard that in case of such lengths, special cables should be used.

Yup, we should think about it. There are double screened cables, I would rather pick one of those because laying inverter cable into already existing installation requires protection.



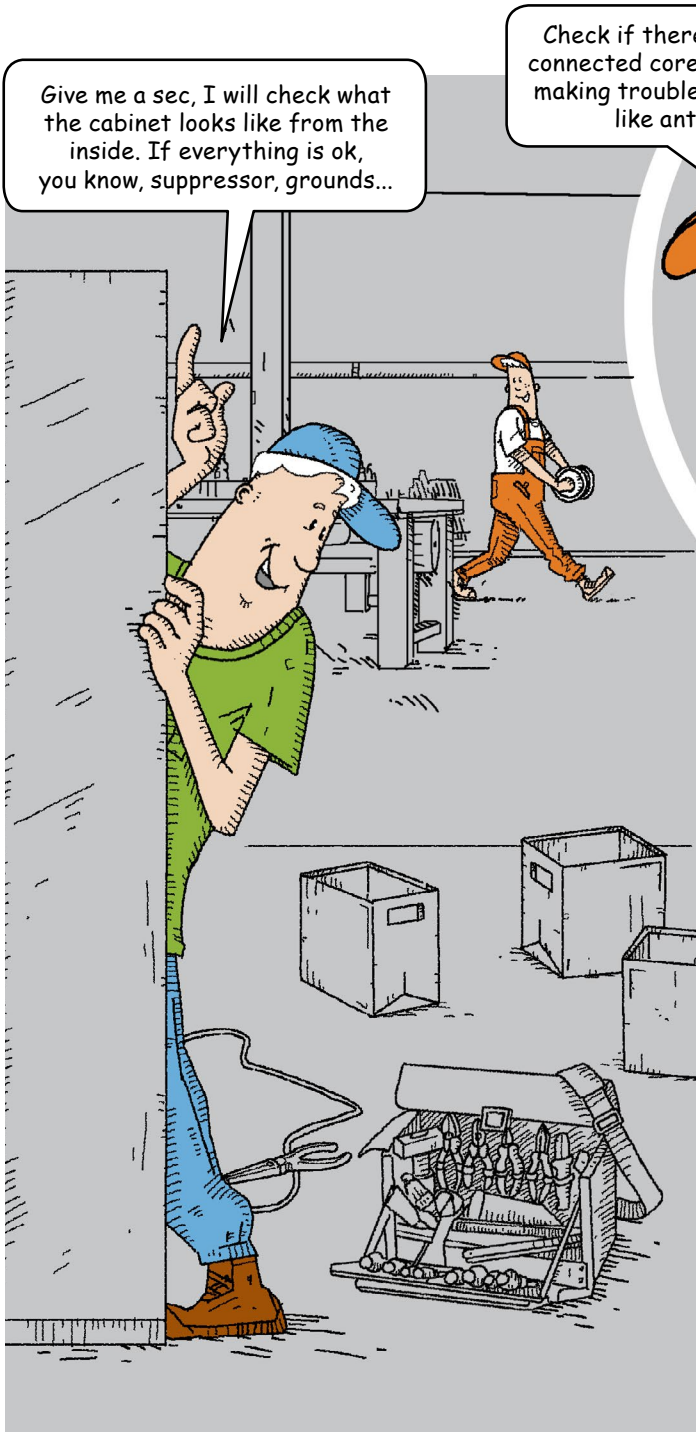


UNCLE LEON'S WORDS OF WISDOM



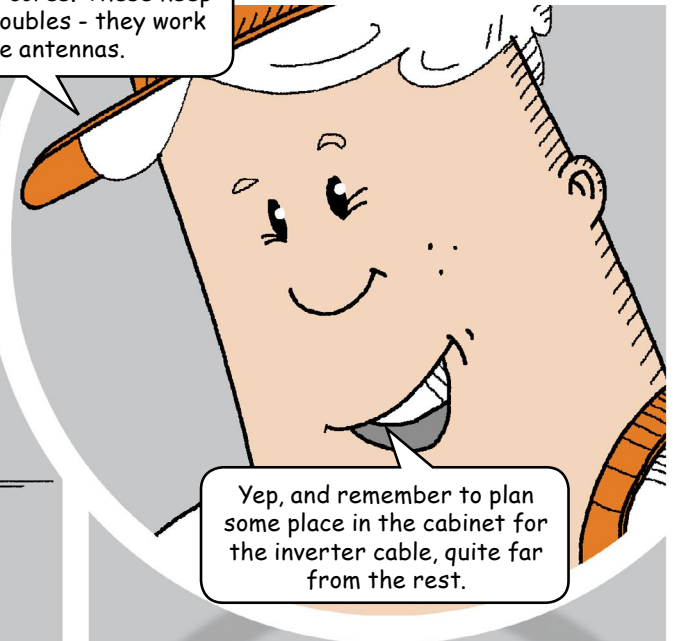
Do not lenghten the screen by using a piece of the wire or by twisting it into plait.



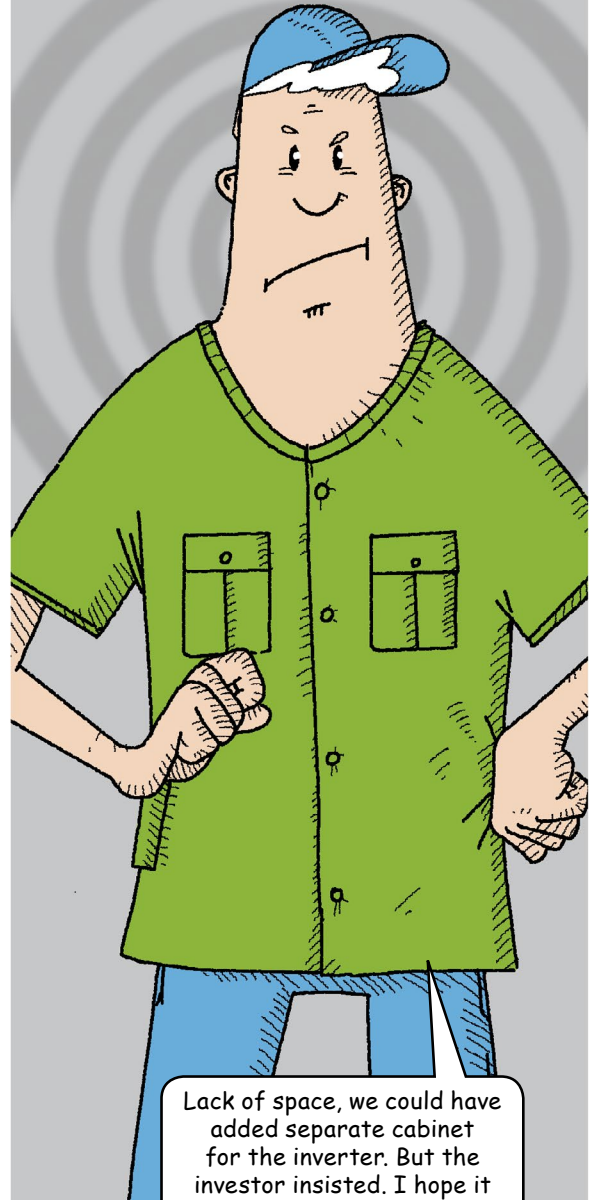


Give me a sec, I will check what the cabinet looks like from the inside. If everything is ok, you know, suppressor, grounds...

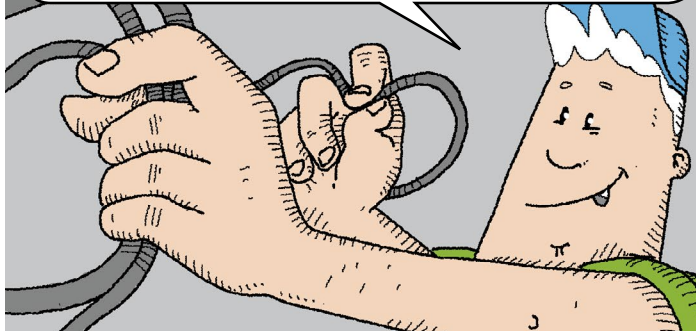
Check if there are any not connected cores. These keep making troubles - they work like antennas.



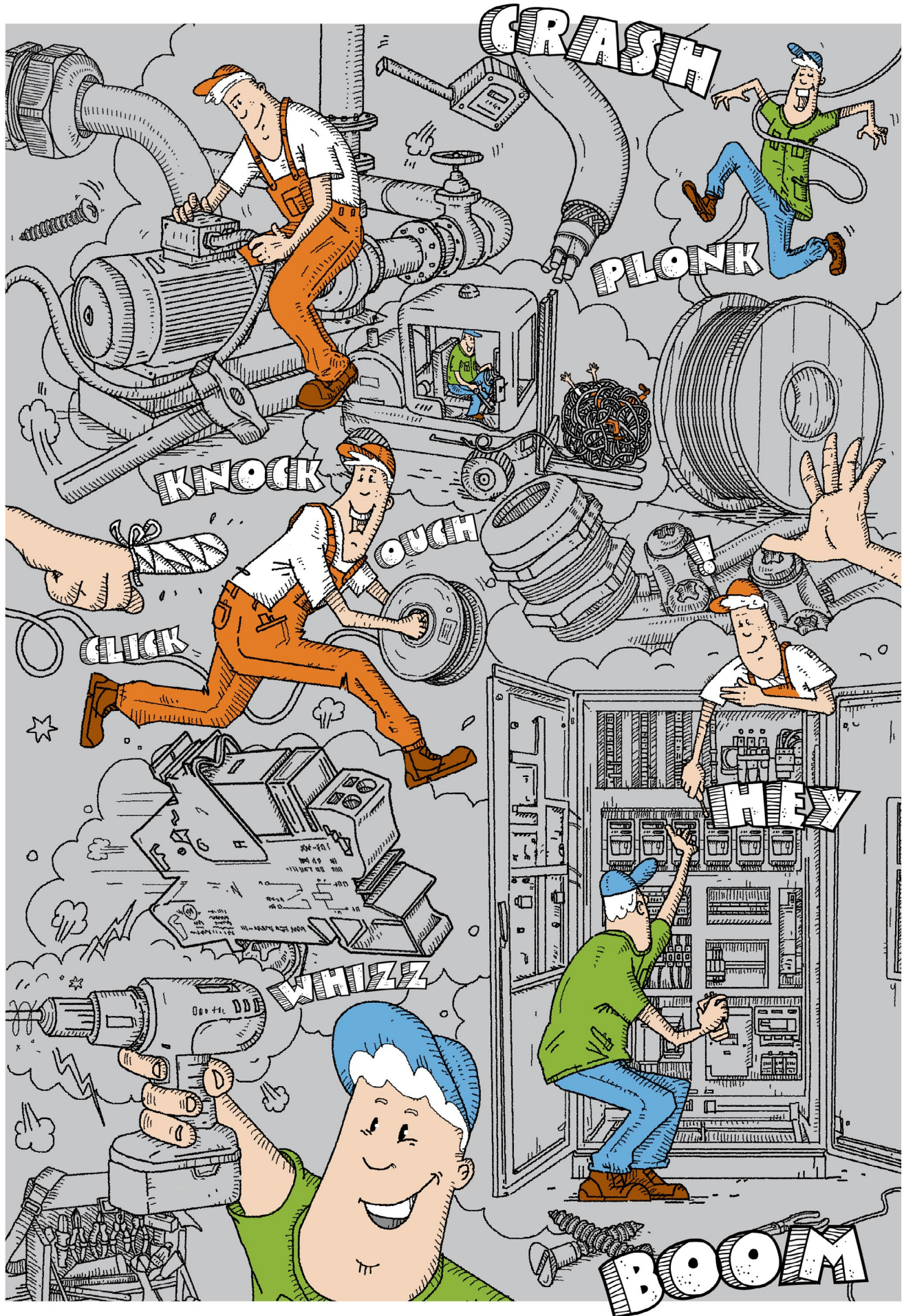
Yep, and remember to plan some place in the cabinet for the inverter cable, quite far from the rest.

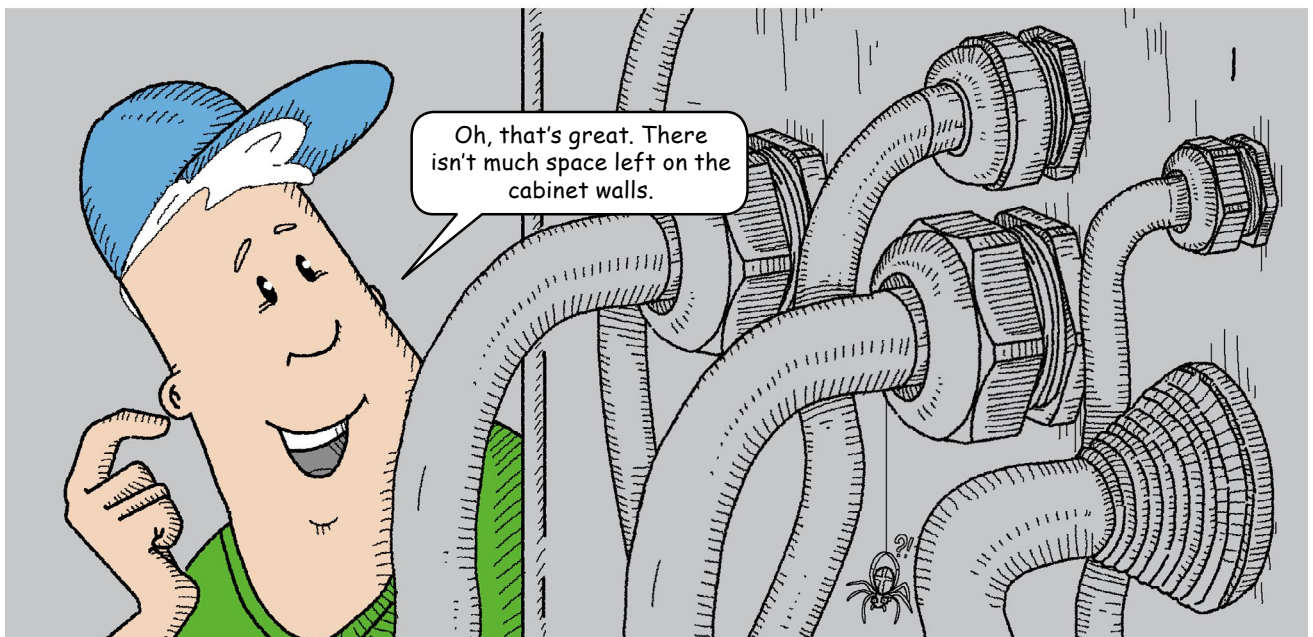
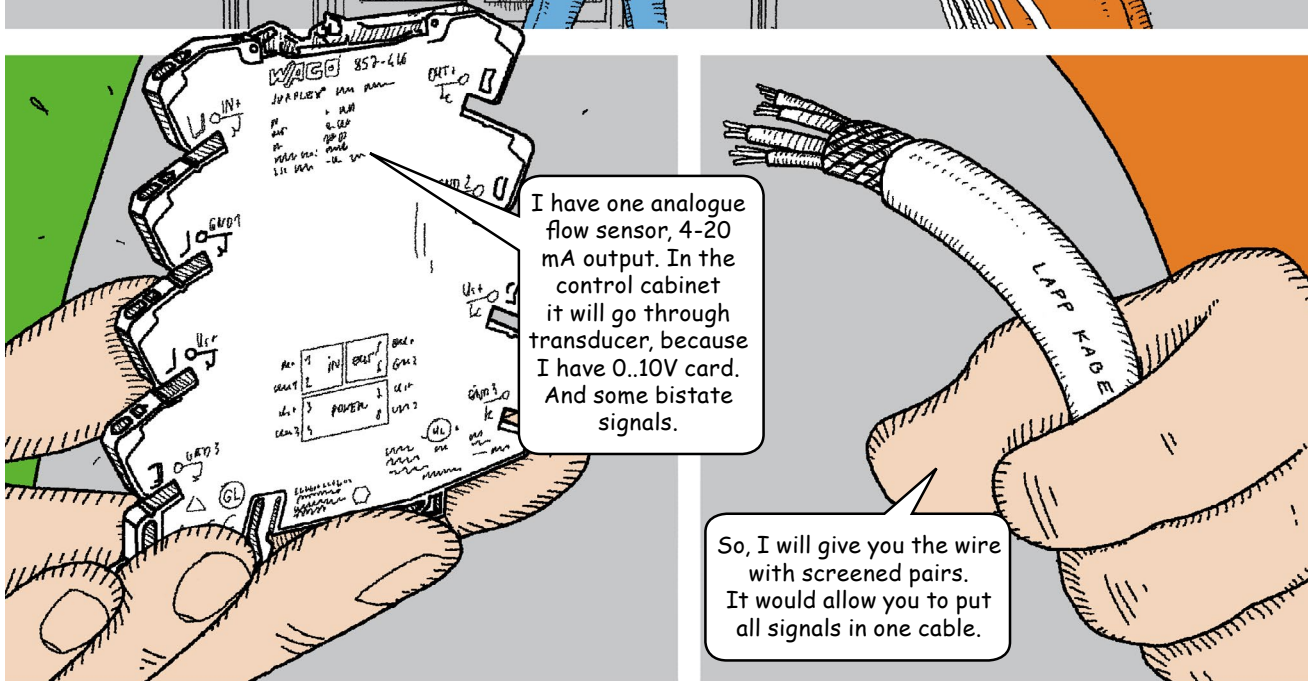
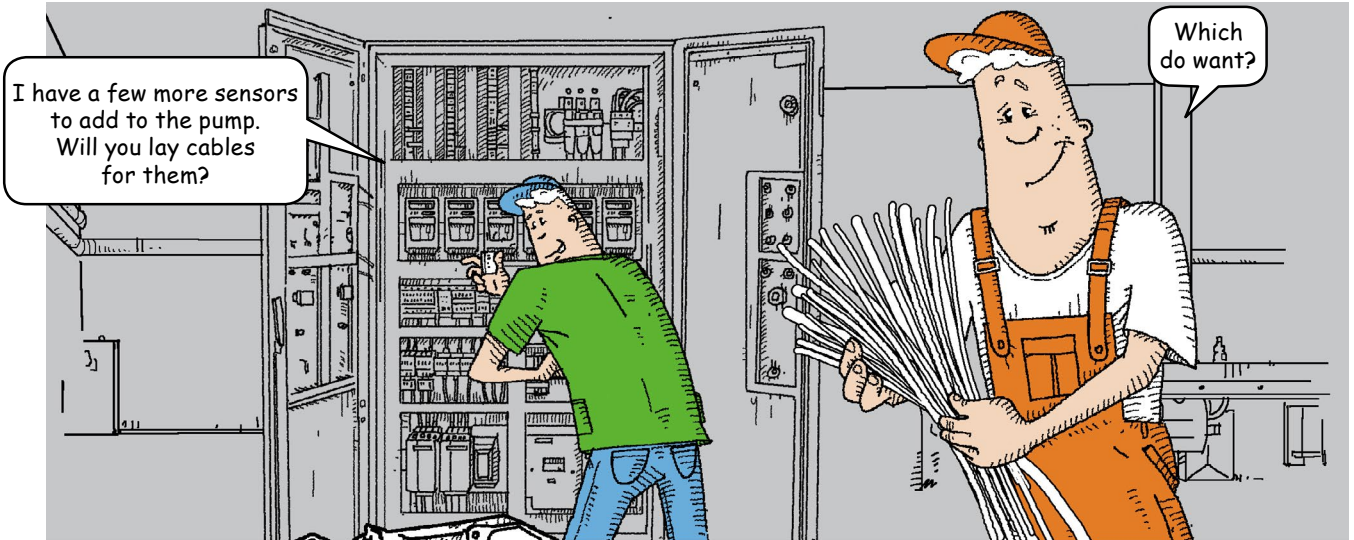


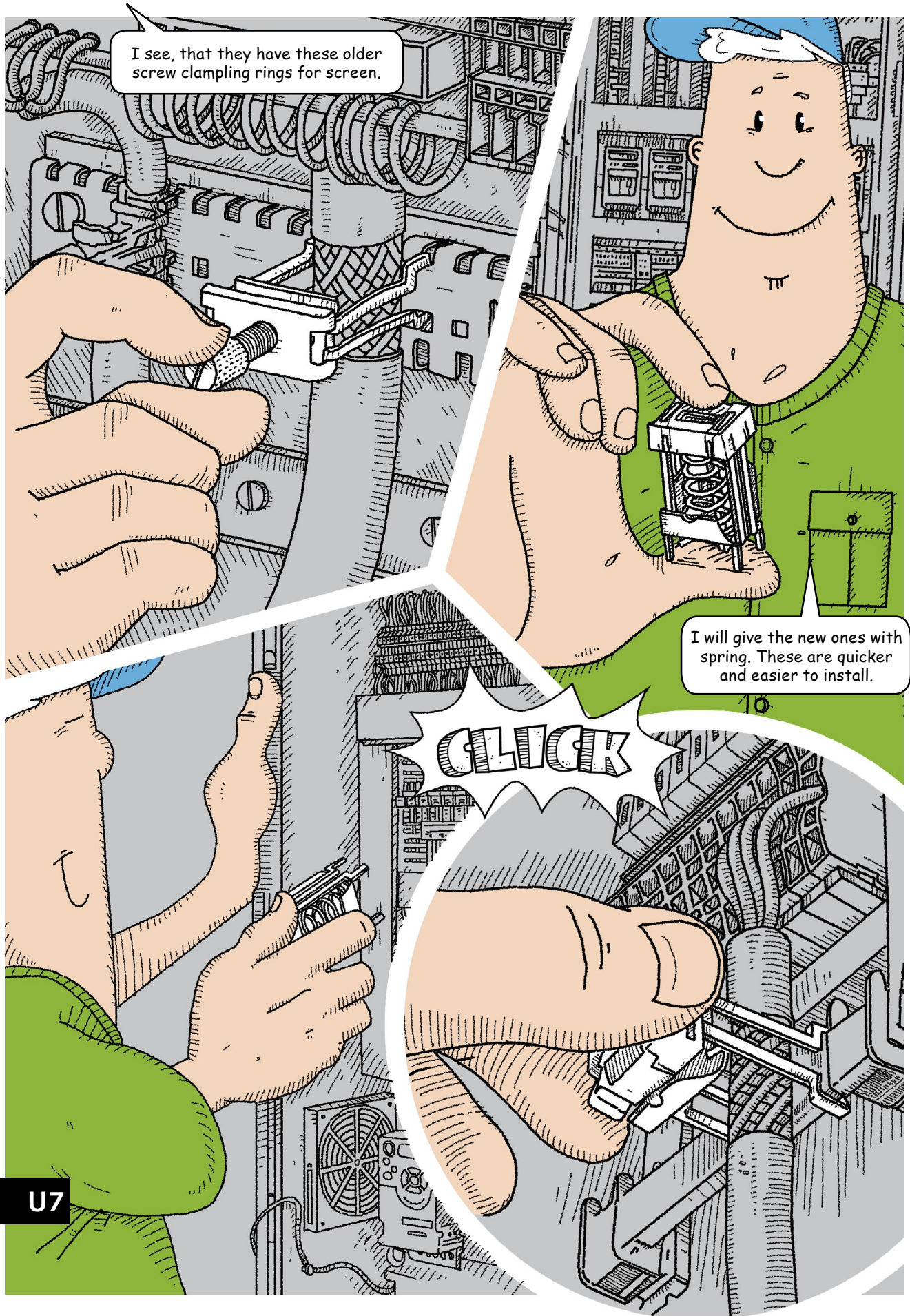
Yes, I know. And I see that there is something wrong with cable layout in the cabinet as well. I have to rearrange this quite a bit to make some place for the inverter.

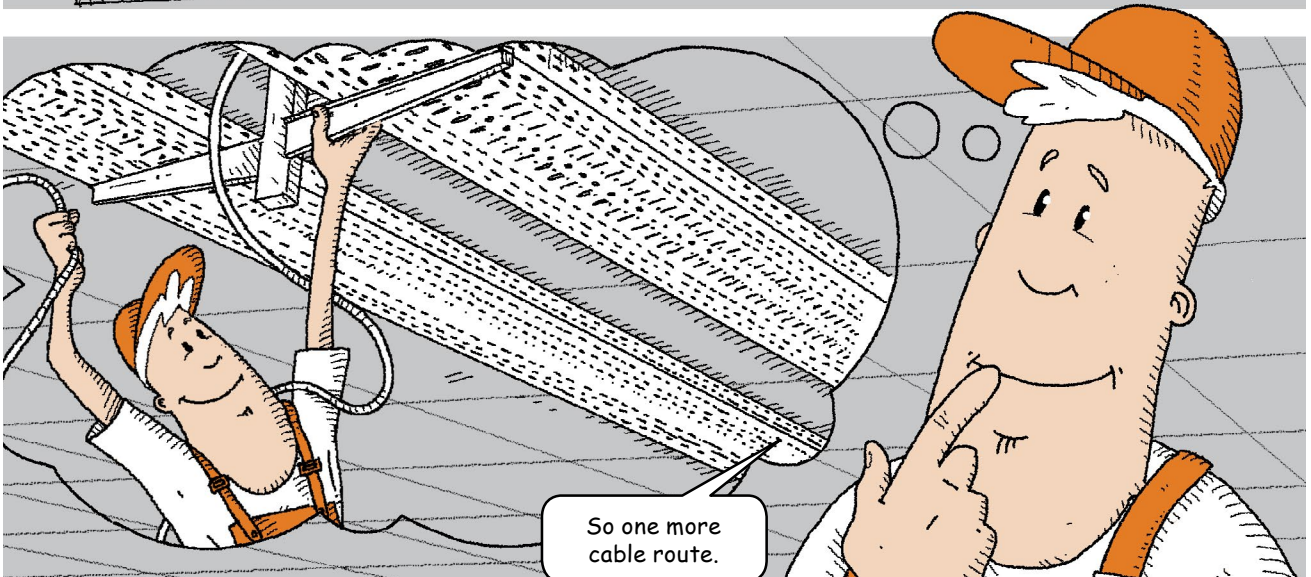
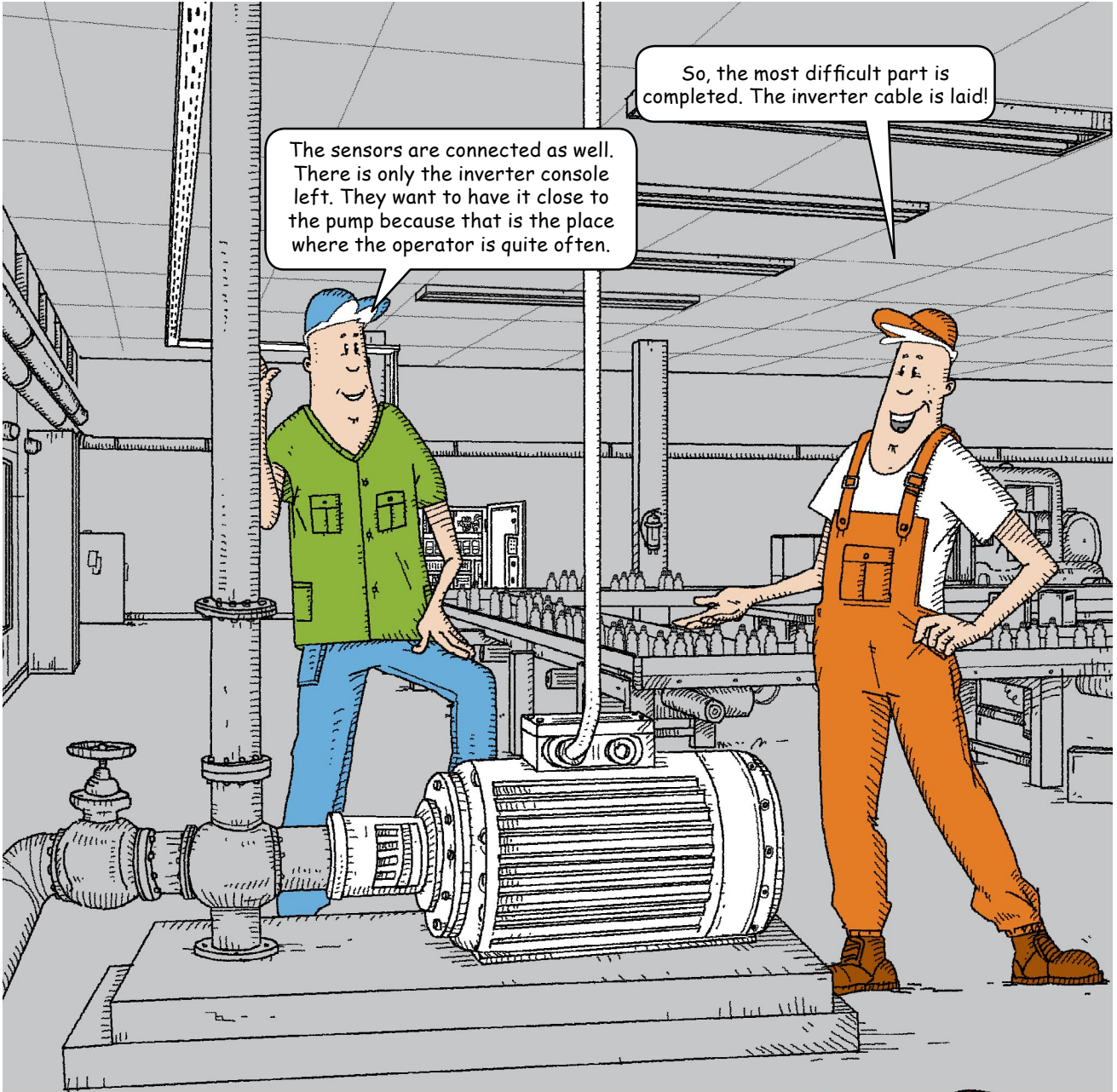


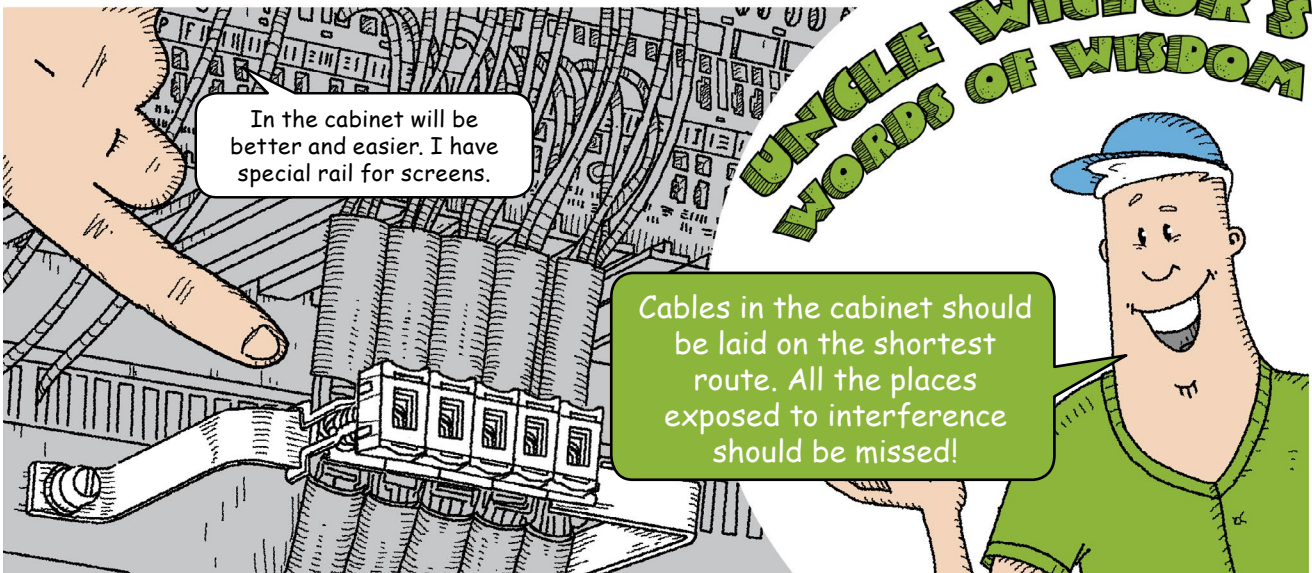
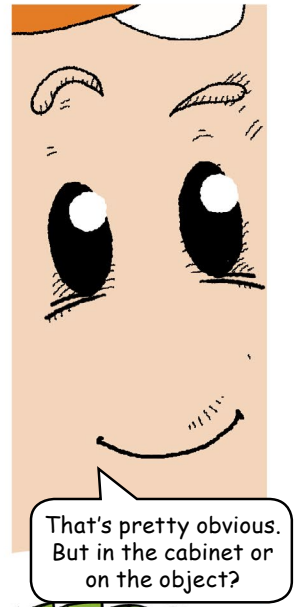
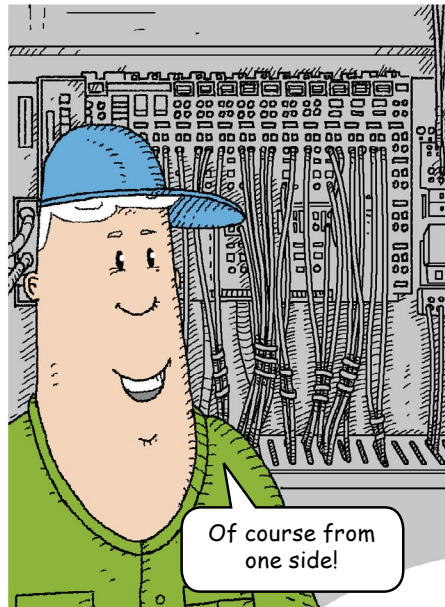
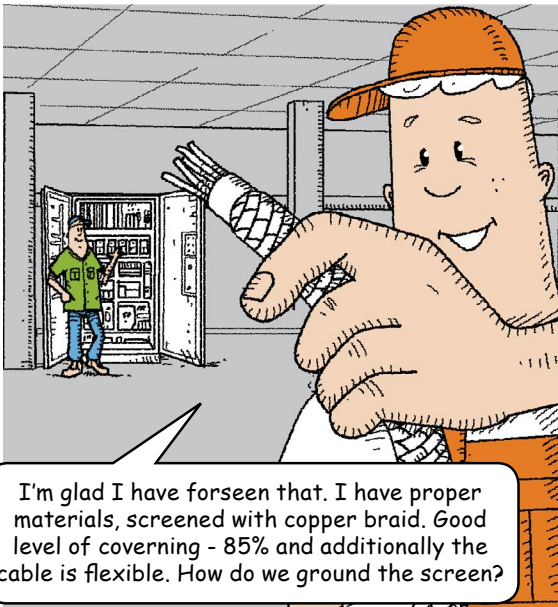
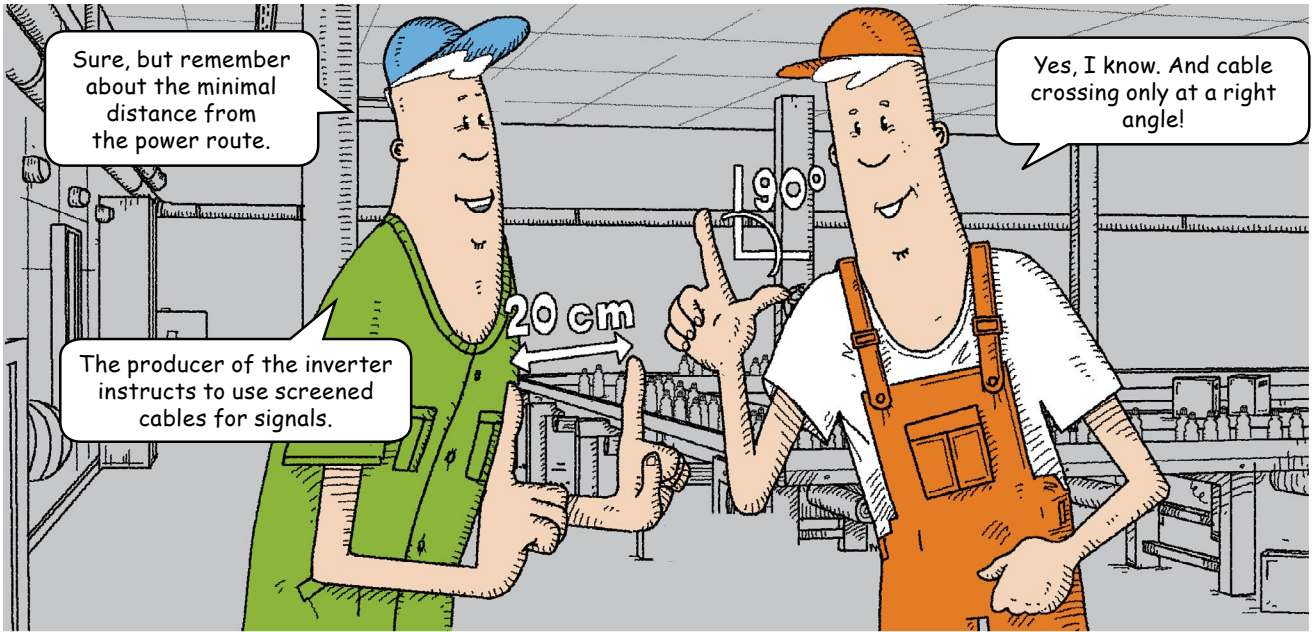
Lack of space, we could have added separate cabinet for the inverter. But the investor insisted. I hope it won't mess up.

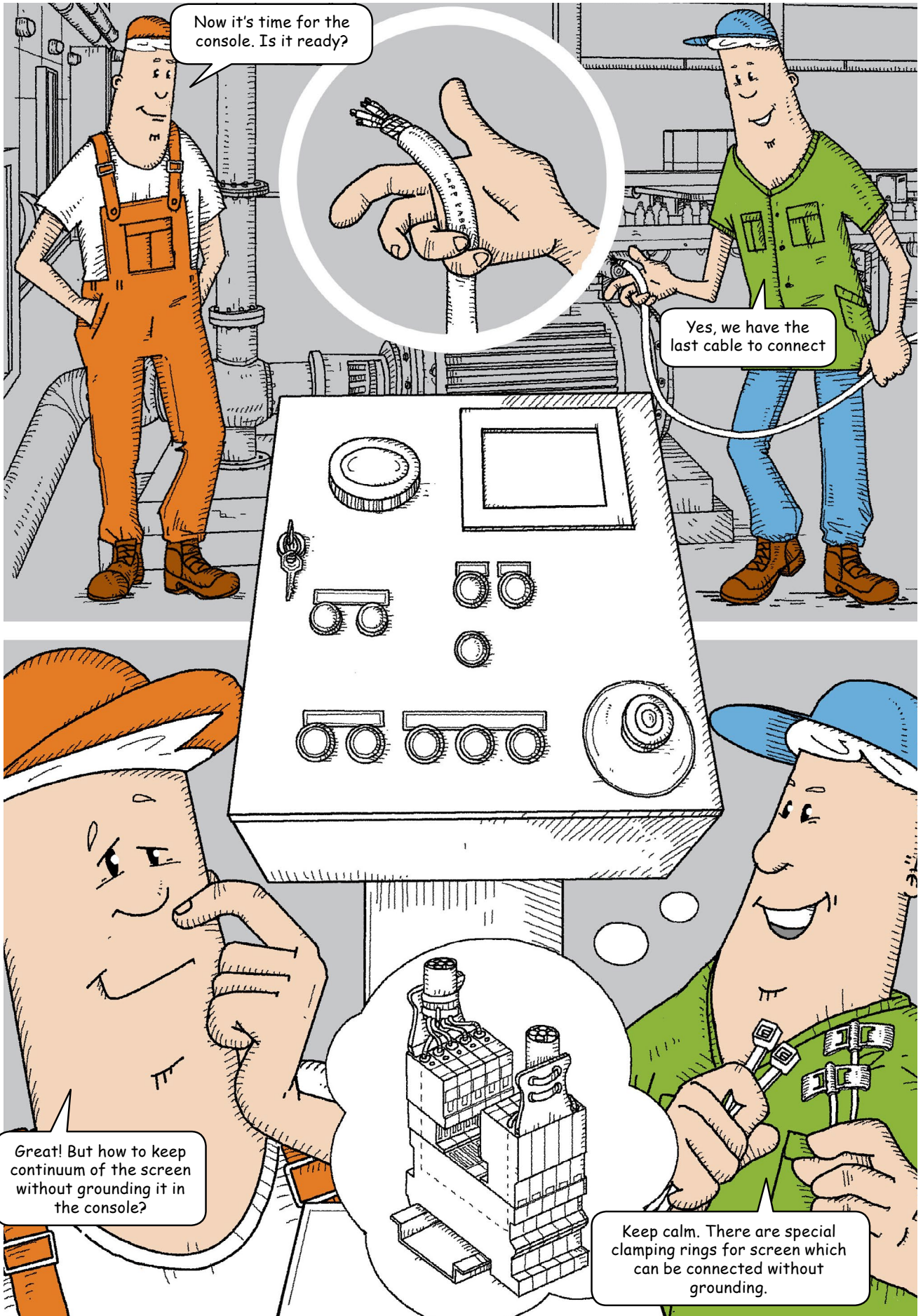


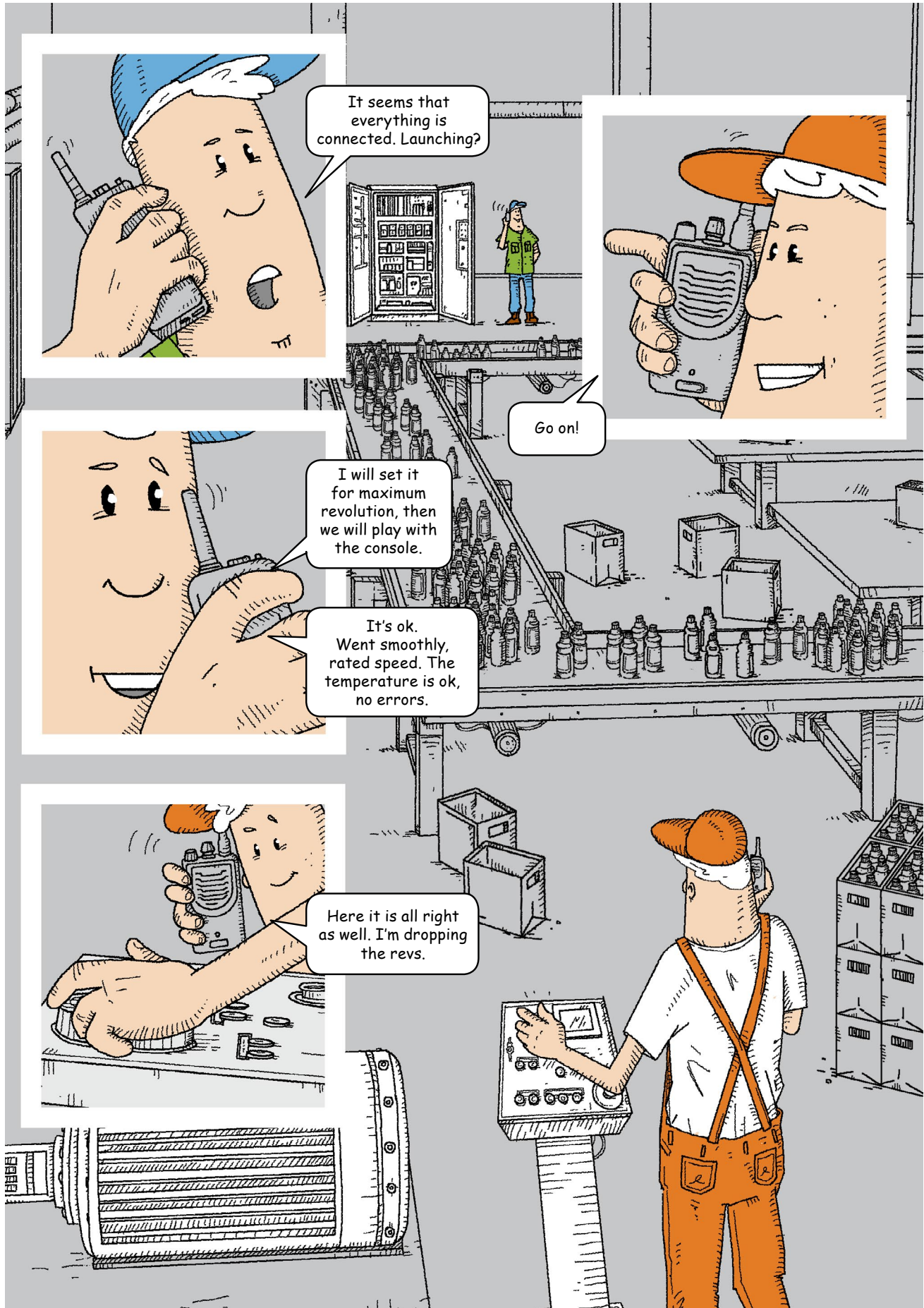


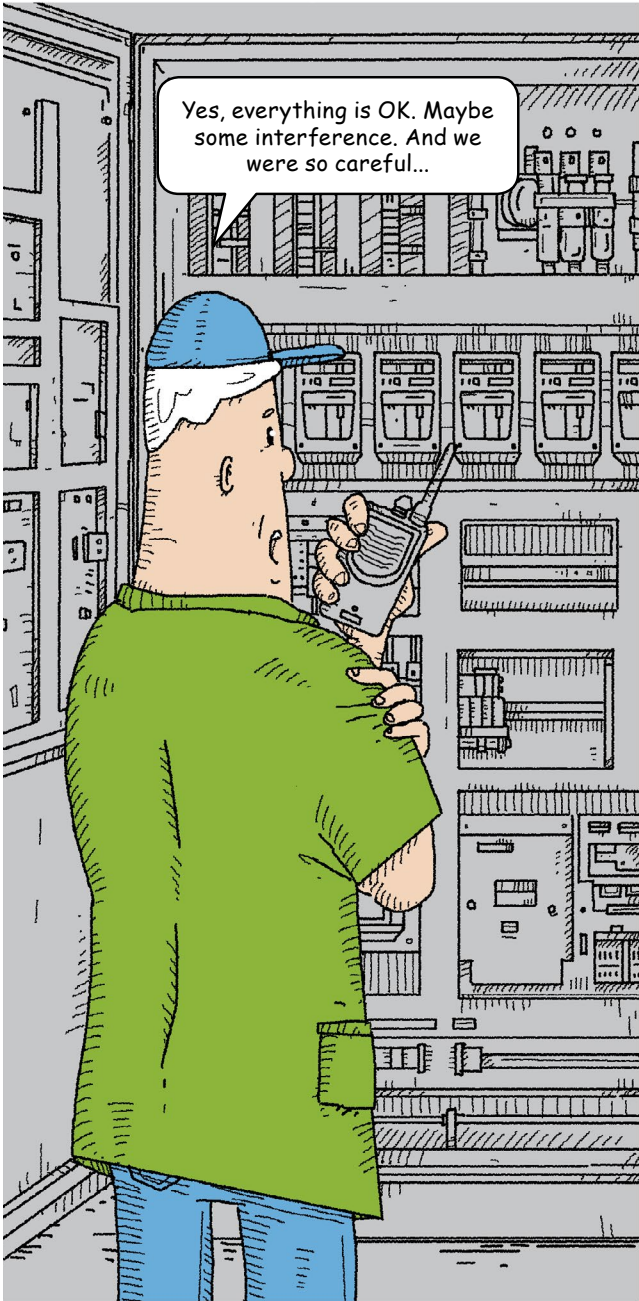
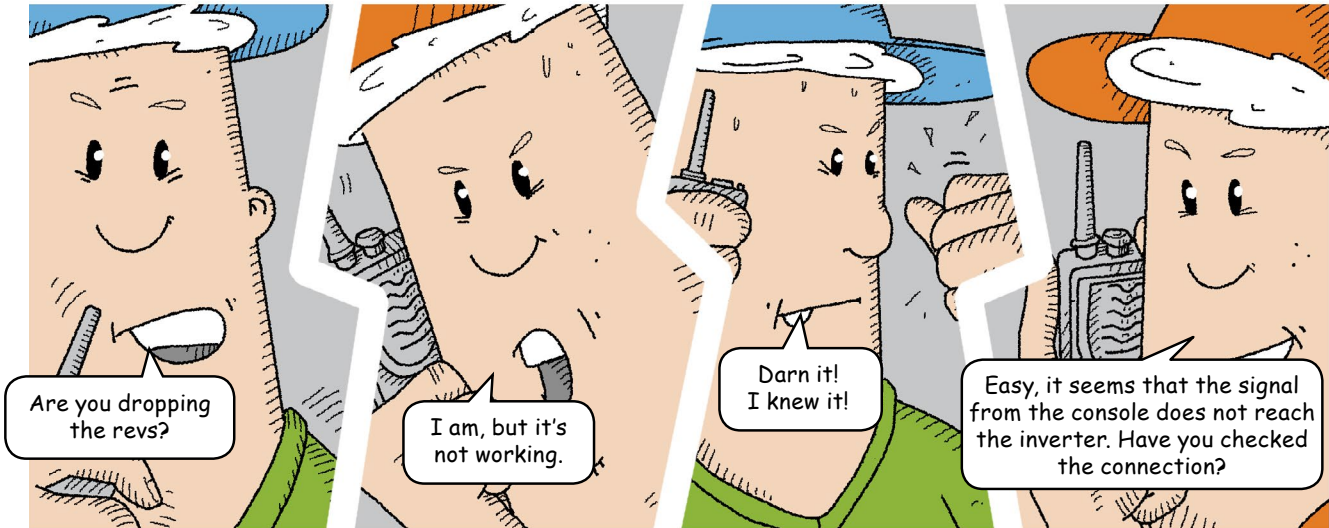


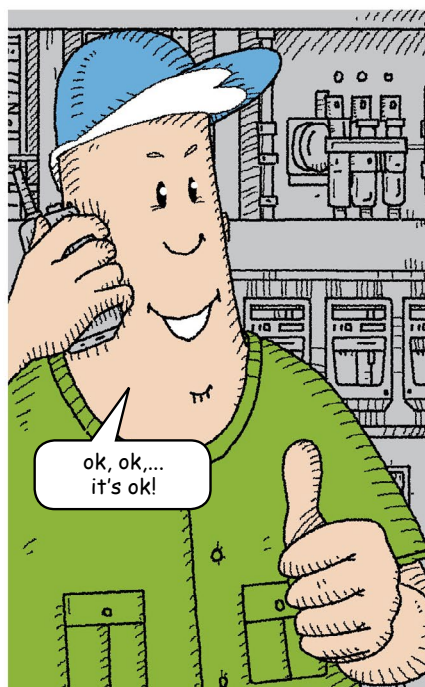
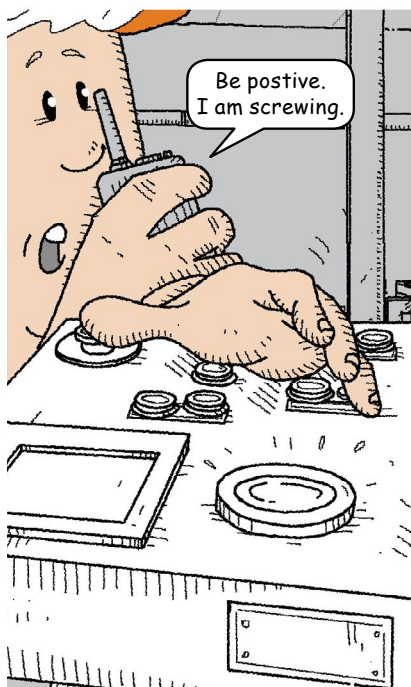
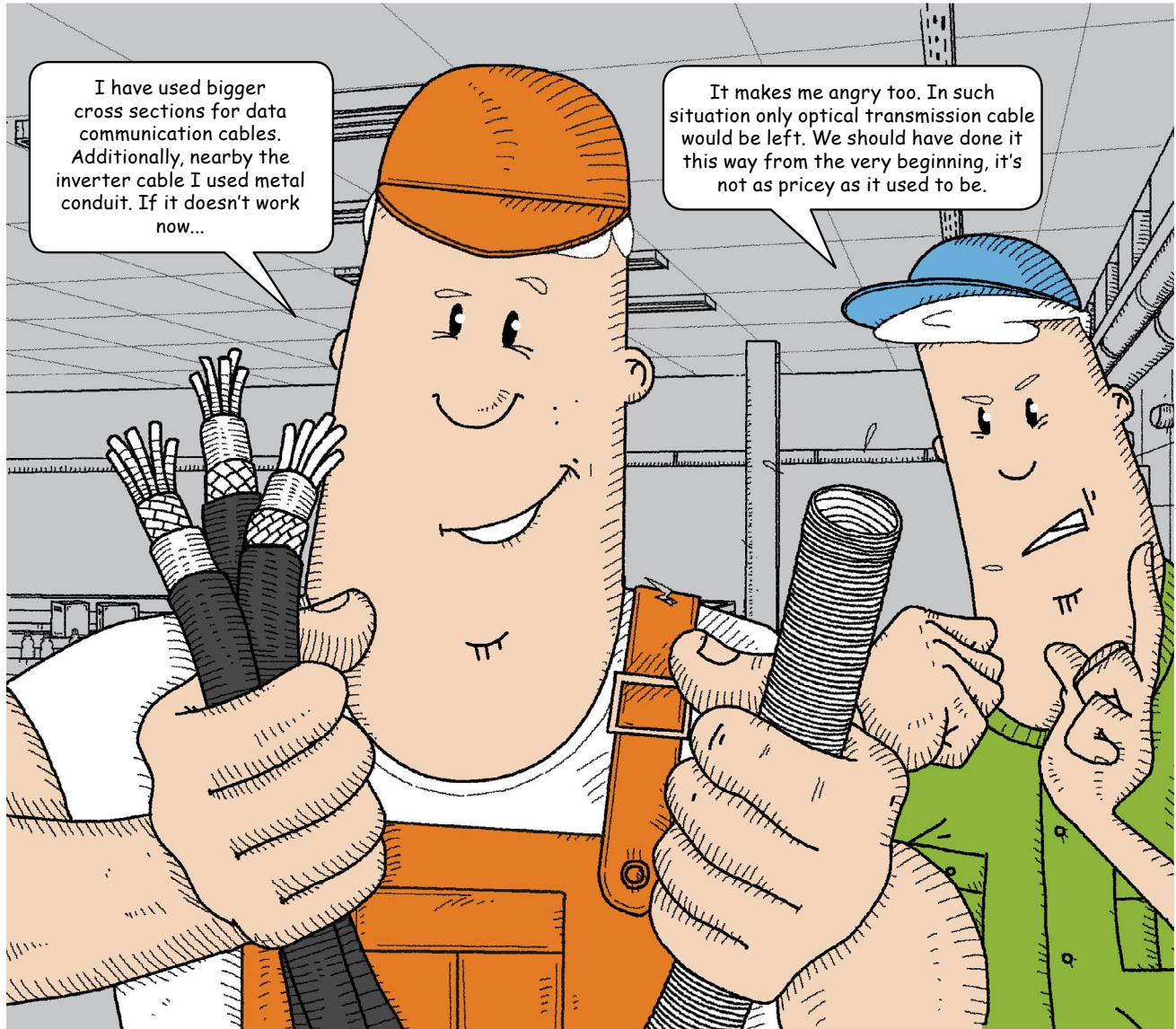


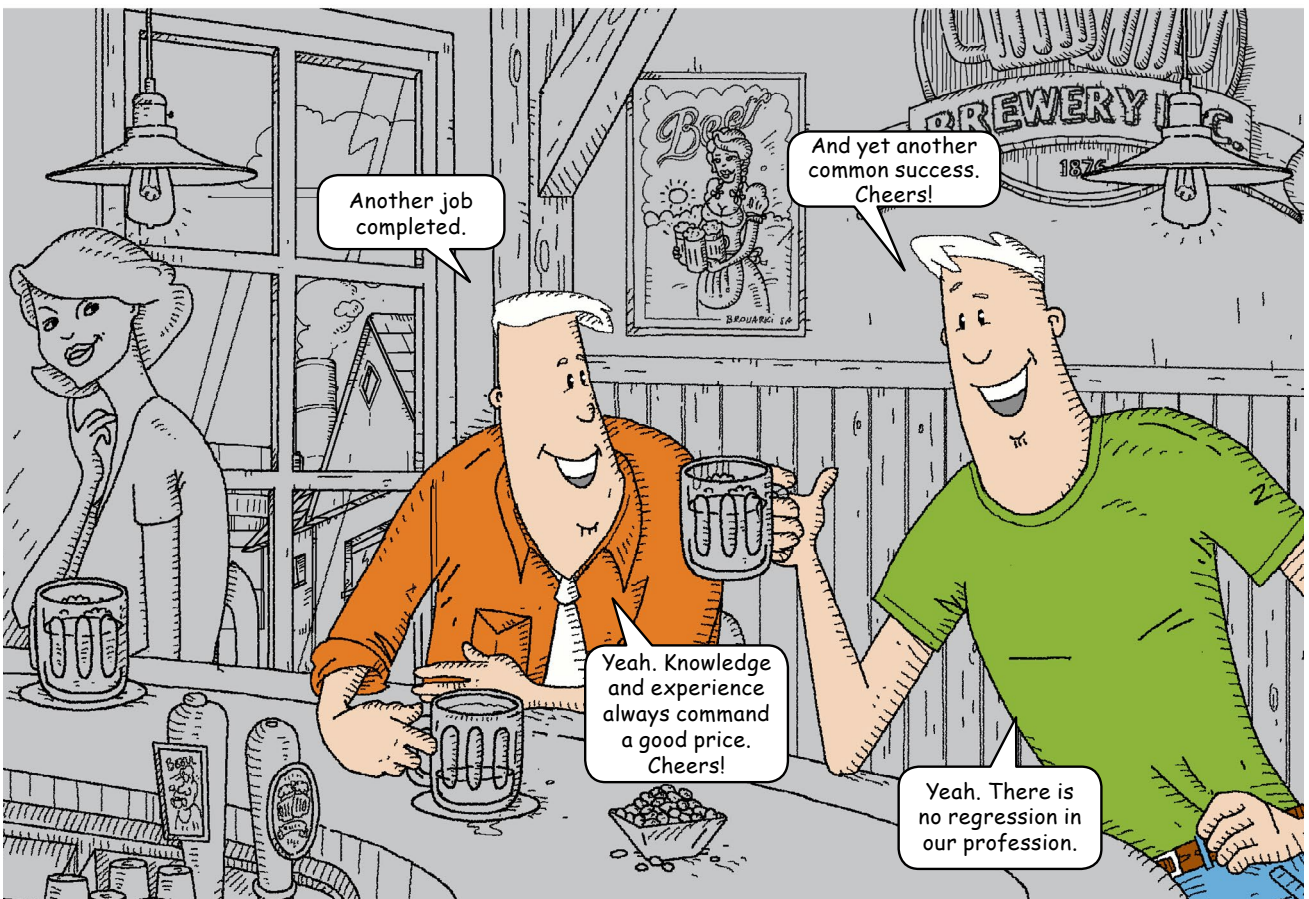
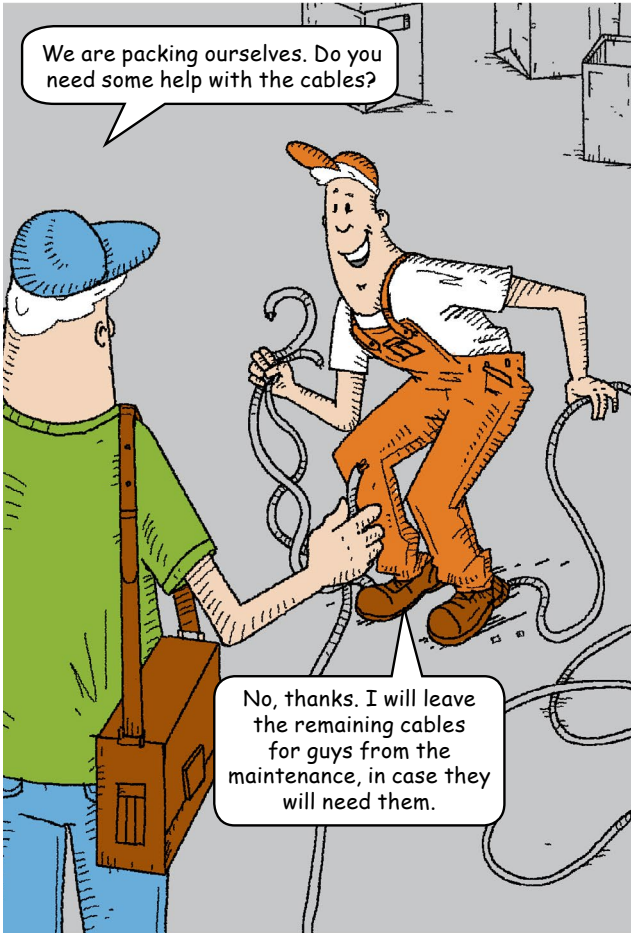












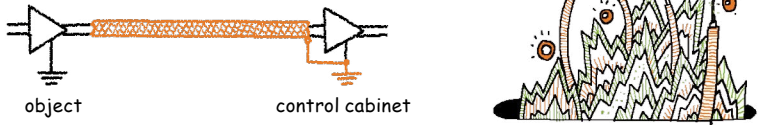

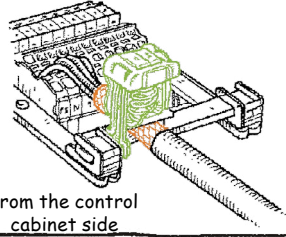
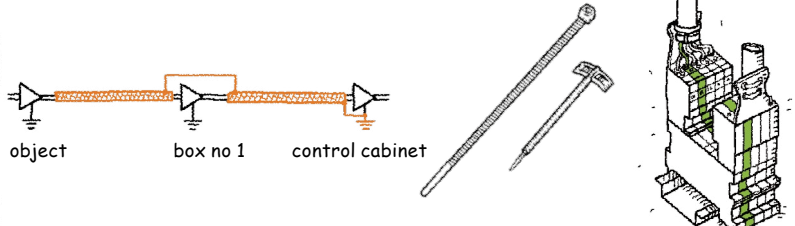

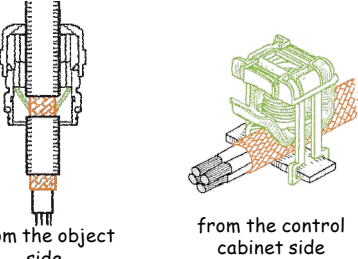
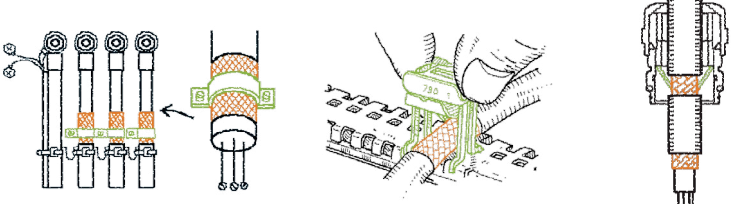
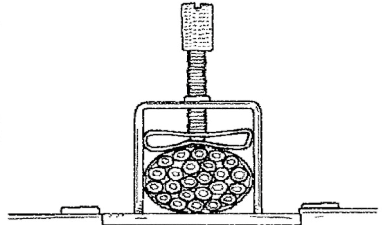
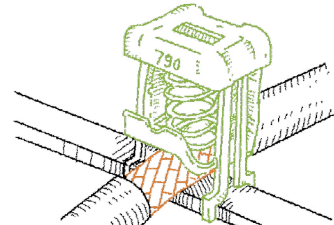
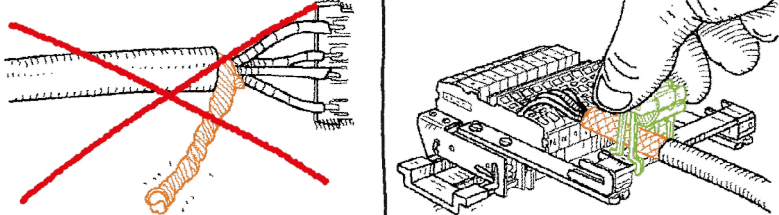
Practical tips

Do not solder

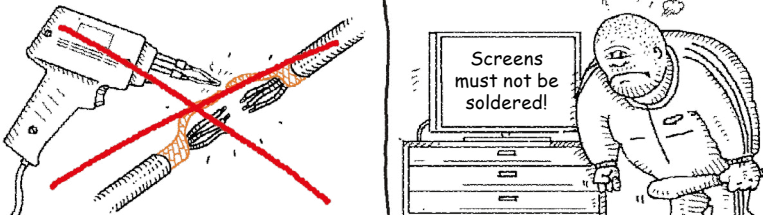
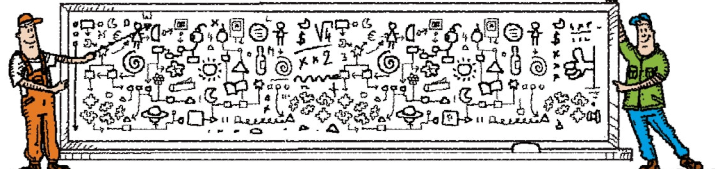

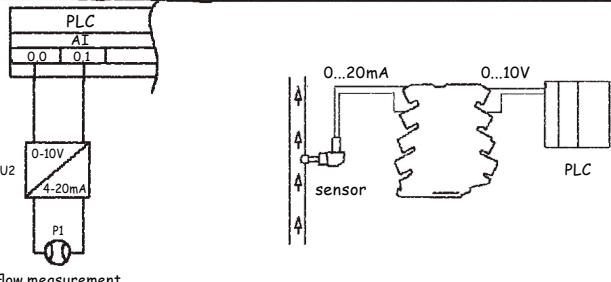
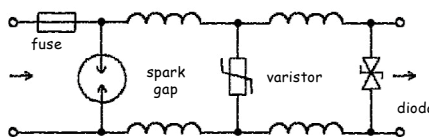
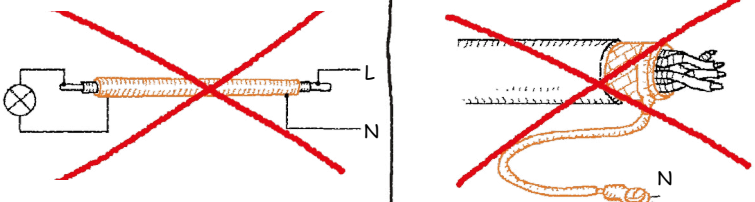
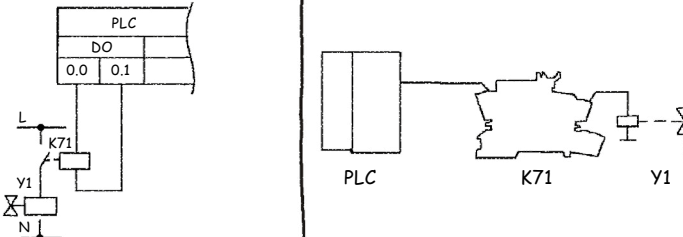
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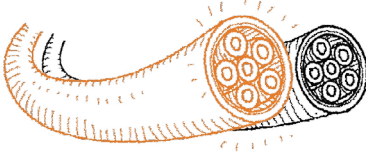

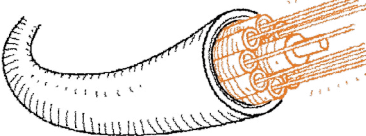
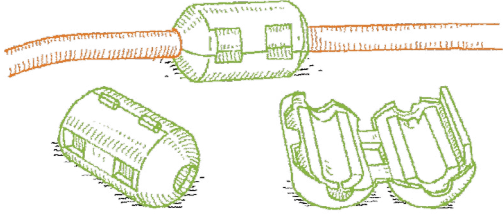
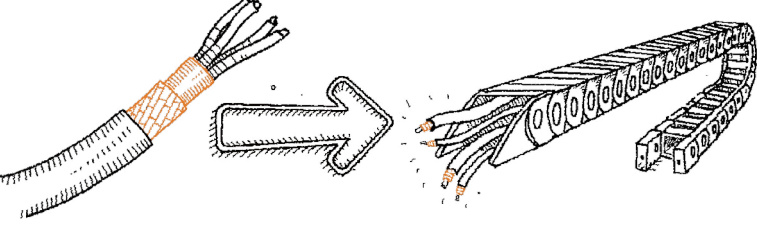
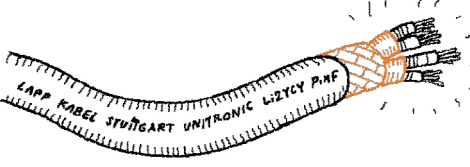
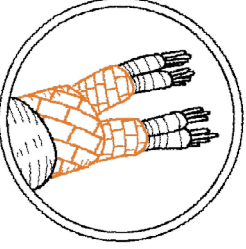

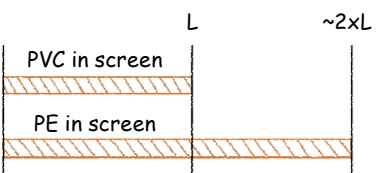
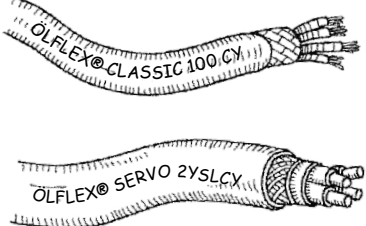


TIPS ABOUT GROUNDING (U)

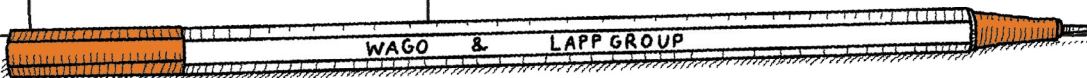
category	tip	sketch	
U1	Screens of control, signal and measurement cables should be grounded from one side. It prevents interference from filtering in into control system.		
U2	One side grounding of control cables, preferably should be done from the control cabinet side - better accessibility of screen, more space.		
U3	If screened cable consists of few sections, the rule about grounding only from one side is still valid. It is important to provide screen continuity but without grounding it at points of connections.		
U4	Inverter cables should be grounded from both sides. One should remember about effective grounding of all devices to unified system of equalising the potential at a whole plant. TN-S Network is an optimal solution providing visible grounding system, in which coming up equalizing powers are immediately detected thanks to usage of residual current device.		
U5	Screen and grounding connection should be done on a big area. Special clamping rings and/or cable gland are useful.		
U6	It is safer to use clamping rings with a spring rather than with a screw holdfast. Physical strenght of the assamler is not relevant then.		
U7	All screen twines, weaves, webs or extensions done with the cable are not recommended.		

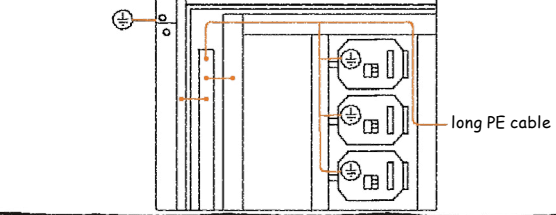
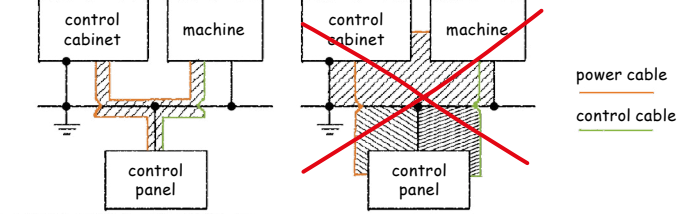
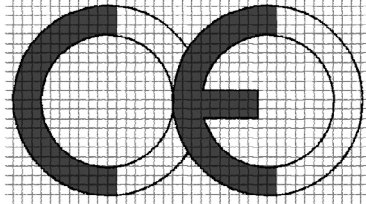
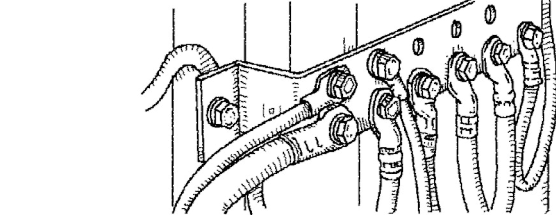
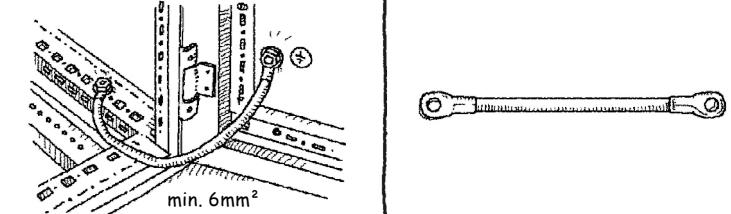
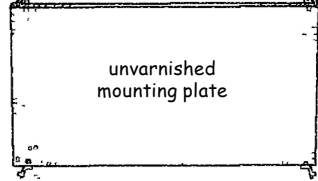
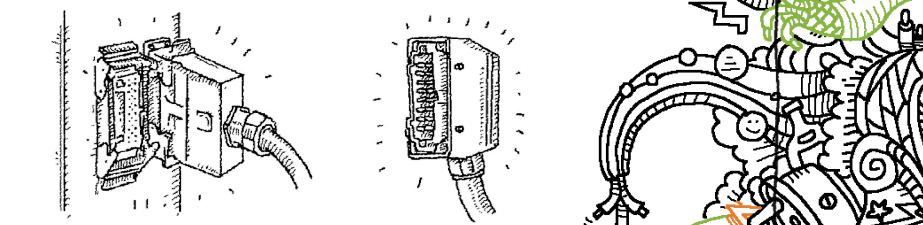
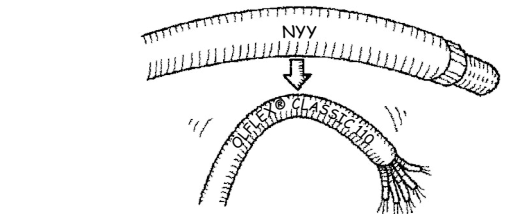
WAGO & LAPP GROUP

category	tip	sketch	
U8	Screens must not be soldered!		
U9	It is more complicated when it comes to BUS cables. You should get to know the guidelines of different BUS standards (Profibus, CAN, itp.)		
U10	Do not let your wife ground you. Go out with your buddy to celebrate your common success. 😊		
ELECTRICAL TIPS (E)			
E1	Analogue current signals (e.g. 4-20mA) are much more resistant to interferences than voltage signals (e.g. 0-10V).	 <p style="text-align: center;">flow measurement</p>	
E2	For given EMC area appropriate devices for overvoltage security should be chosen.		
E3	Screens must not be used as power cores.		
E4	To eliminate the influence of equalizing powers in bistate control cables, separation through transmitter or opto-isolator should be done.		

<p>E5</p>	<p>In case of signals specially sensitive to interferences cables with bigger cross-section should be used.</p>		 <p>Do you know what time it is?... Do not count on lack of INTERFERENCES at home!</p>
<p>E6</p>	<p>Sometimes, the only way to avoid interferences in data transmission is using fiberoptic cables instead of copper ones.</p>		
<p>E7</p>	<p>Cables for local and network data transmission should be protected from influence of interferences by ferrite filters.</p>		
<p>E8</p>	<p>In case of big cross-section of power cables, instead of multicore cables, single screened cores can be used. These will be more flexible and easier to lay.</p>		
<p>E9</p>	<p>In case of signals specially sensitive to interferences paired cables in individual screens for each pair should be used.</p>		
<p>E10</p>	<p>Signals being the source of strong EMC interferences (e.g. from the inverter) cables in two screens (copper braid + aluminium foil) should be used</p>		
<p>E11</p>	<p>Maximal lenghts of screened cables depend on the kind of the cable. Usually, in screened cables it is about 70m, in case of low capacity cables about 130m</p>		

ASSEMBLY TIPS (M)		
<p>M1</p>	<p>Proper placement and division of network and controlling apparatus from power apparatus in the control cabinet is very important.</p>	
<p>M2</p>	<p>To improve the effectiveness of screening cables should be laid in metal ducts or pipes.</p>	
<p>M3</p>	<p>„Ground“ connection between individual control cabinets or metal parts should be done with low impedance cables with big cross-section, min 16mm².</p>	
<p>M4</p>	<p>The ends of unused cables should be connected to each other and grounded.</p>	
<p>M5</p>	<p>Signal cables should be laid as far away from power cables as it is possible, not closer than 20 cm.</p>	
<p>M6</p>	<p>Power cables should be laid as closest as possible to ground potential.</p>	
<p>M7</p>	<p>If you have to cross the cables of different kind of signals, it should be done at a right angle and as far as possible from each other.</p>	

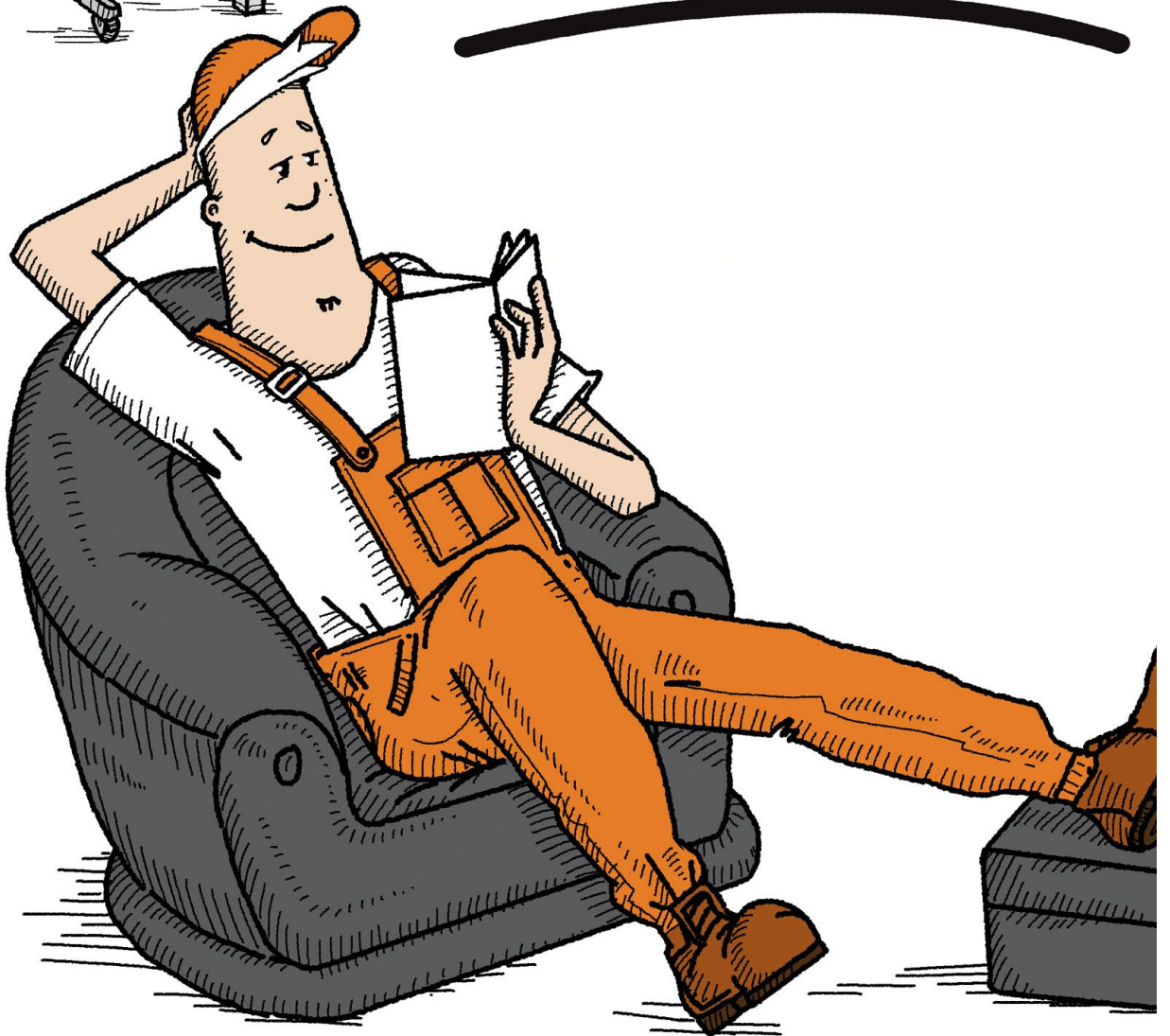


<p>M8</p>	<p>Cables in the cabinet should be laid on the shortest possible route, without unnecessary length savings and with omission of places especially subjected to EMC interferences,</p>	
<p>M9</p>	<p>While planning the wiring one should avoid inductive loops which may lead to EMC interferences filtering in to the system.</p>	
<p>M10</p>	<p>In electrical systems only devices consistent with directive of electromagnetical compatibility 2014/30/UE should be used.</p>	
<p>M11</p>	<p>Central, unambiguous point of control cabinet grounding should be defined.</p>	
<p>M12</p>	<p>All metal elements of the control cabinet should be connected with the grounding by the shortest possible cable with min. 16 mm² cross-section. It also involves moving parts such as doors.</p>	
<p>M13</p>	<p>In order to limit EMC interferences, mounting plates cannot be varnished.</p>	
<p>M14</p>	<p>Connectors make service of the installation easier. For screened cables these also should provide the continuity of screening.</p>	
<p>M15</p>	<p>For sure, multi-wired cables will be more flexible than solid ones. It would save your energy and the work will be easier.</p>	

NOTES

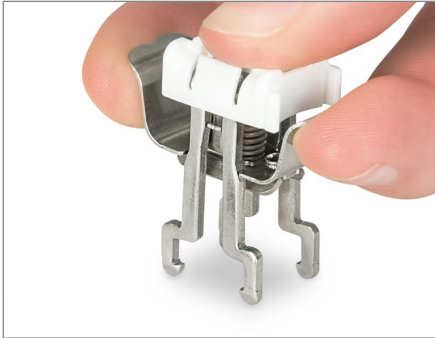


Catalogue



Spring-Equipped Shield Clamping Saddles – series 790

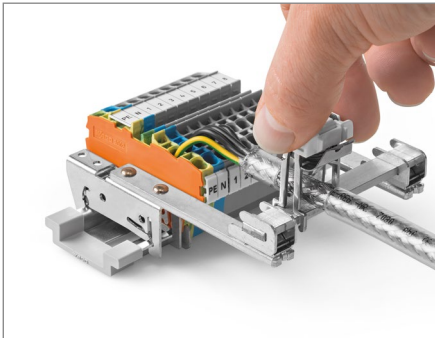
Item No.	Pack. Unit
shield clamping saddle	
shield diameter from 3 mm to 8 mm	
wide 12,4 mm	
① 790-208	50
shield clamping saddle	
shield diameter from 6 mm to 16 mm	
wide 12,8 mm	
② 790-216	25
shield clamping saddle	
shield diameter from 6 mm to 20 mm	
wide 30 mm	
③ 790-220	25



Compress the clamping saddle until fully engaged.



Labelling using a marking strip (10 x 3) mm



Clenching lateral activating elements. It may cause displacement of the spring and deadlock of clamping ring on the rail. When releasing the saddle, do not place your finger under the clamping spring!

Delivery position

Mounting position

Item No.	A	B	C	D	E*
Dimensions in mm					
790-208	30	29,9	8	12,4	25,8
790-216	34,6	28,3	16	21,8	30,2
790-220	45,6	28,3	24	30	41,2

*Height with WMB marker

i Info

- Cannot be used for connecting ground conductors
- Cannot be used as strain relief

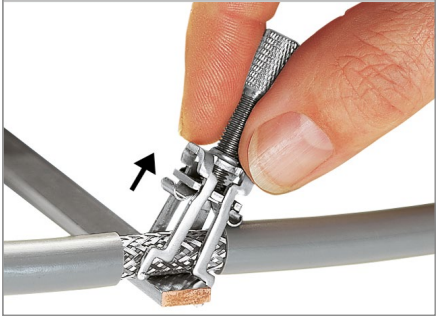
Screw-Equipped Shield Clamping Saddles – series 790

Item No.	Pack. Unit
shield clamping saddle shield diameter to 8 mm wide 11 mm	
④ 790-108	50 (5x10)
shield clamping saddle shield diameter from 7 mm to 16 mm wide 19 mm	
⑤ 790-116	50 (5x10)
shield clamping saddle shield diameter from 6 mm to 24 mm wide 27 mm	
⑥ 790-124	50 (5x10)
shield clamping saddle shield diameter from 22 mm to 40 mm wide 43 mm	
⑦ 790-140	50 (5x10)



Assembly

The shield clamping saddle is shipped ready for direct connection to the (10 x 3) mm busbar or to a drilled mounting plate. After connection, tighten the knurled screw to complete the installation.



Removal

To remove the clamping saddle, unscrew until ratcheted mechanism is released, then slightly tip saddle and remove the clamping saddle.

Installation position
(delivery state)

Mounting position
(closed position)

Removal position
(open position)

Item No.	A	B	C	D	E	F
Dimensions in mm						
790-108	51	15	8	16	55	42
790-116	53	15	16	16	57	45
790-224	78	15	24	16	83	58
790-140	97	15	40	16	100	73

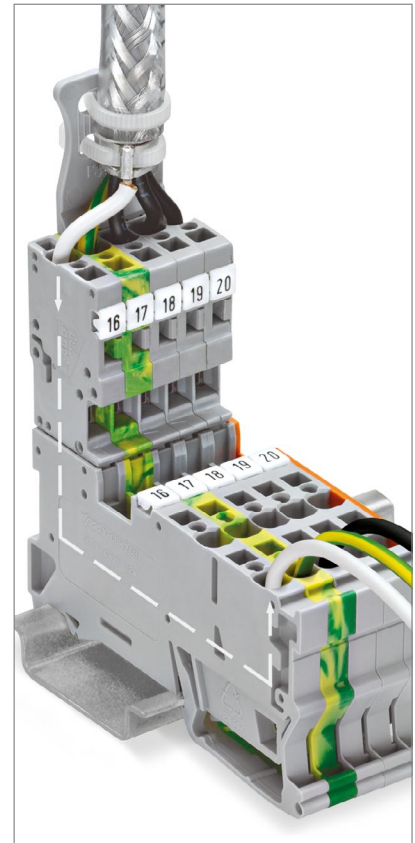
i Info

- Cannot be used for connecting ground conductors
- Max. screw tightening torque: 0,5 Nm

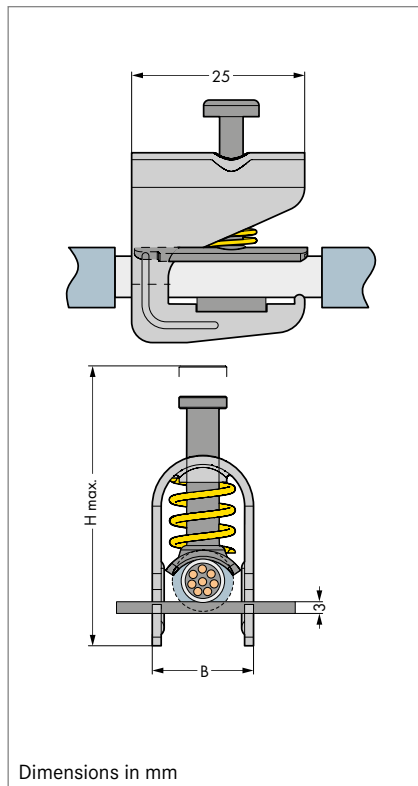
Shield Clamps and Shield Termination – series 791 and 709



Item No.	Pack. Unit	Item No.	Pack. Unit
shield clamp shield diameter from 1,5 mm to 6,5 mm H _{max.} 40 mm, B 10 mm ⑧	791-107 50	shield termination includes cable ties for shield 5 mm and 10 mm shield diameter, 55 mm long ⑫	709-350 100 (4x25)
shield clamp shield diameter from 5 mm to 11 mm H _{max.} 47 mm, B 17 mm ⑨	791-111 50	shield termination includes cable ties for shield 5 mm and 10 mm shield diameter, 150 mm long ⑬	709-352 100 (4x25)
shield clamp shield diameter from 10 mm to 17 mm H _{max.} 63 mm, B 23 mm ⑩	791-117 50		
shield clamp shield diameter from 16 mm to 24 mm H _{max.} 78 mm, B 30 mm ⑪	791-124 50		







Shield termination connected to an X-COM® modul



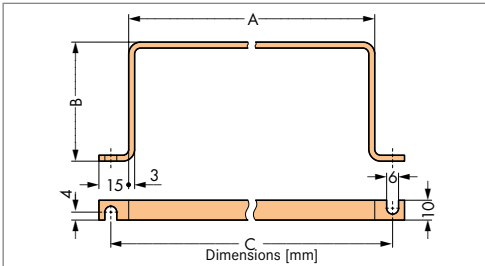
i Info

- Cannot be used for connecting ground conductors
- Spring of the clamping ring 791 should remain opened.
- Clamping ring from series 709- optimal solution to connect the screen to the connector, especially in case of providing continuity of the screen without grounding it.

Shield Clamping Saddles series 790 – Accessories

Item No.	Pack. Unit	Item No.	Pack. Unit	Item No.	Pack. Unit
straight busbar, tin-plated  Cu 10 mm x 3 mm, length 1000 mm ⑭ 790-133	1	carrier with grounding foot for busbar TS 35, tin-plated  Cu 10 mm x 3 mm, busbar 90° to the rail length 45 mm ⑳ 790-113	25	Busbar carrier  for busbar Cu 10 mm x 3 mm both sides, straight contact to TS 35 distance between center of TS 35 and busbar carrier: 70 mm ㉑ 790-310	10
straight busbar, tin-plated  Cu 10 mm x 3 mm, length 50 mm, ⑮ 790-134	20	carrier with two grounding feet for busbar TS 35, tin-coated  Cu 10 mm x 3 mm, busbar parallel to the rail length 125 mm, ㉒ 790-115	25	busbar carrier  for busbar Cu 10 mm x 3 mm both sides, straight contact to TS 35 distance between center of TS 35 and busbar carrier: 80 mm ㉓ 790-312	10
straight busbar, tin-plated  Cu 10 mm x 3 mm, length 30 mm ⑯ 790-133	20	carrier rail TS 35, specialty perforated  tin-coated length 1000 mm, other lengths on request ㉔ 790-145	1	busbar carrier  for busbar Cu 10 mm x 3 mm both sides, angled contact to TS 35 distance between center of TS 35 and busbar carrier: 70 mm ㉕ 790-311	10
U-shaped busbar, tin-plated  Cu 10 mm x 3 mm, for I/O 750 Series modules up to 5 modules ⑰ 790-190	25	spacer sleeve  for perforated mounting rail TS 35 for M5-size screw ㉖ 790-144	200 (2x100)	busbar carrier with a T-connector, flexible  for busbar Cu 10 mm x 3 mm single side, angled, height 56 mm contact to TS 35 distance between center of TS 35 and busbar carrier: 70 mm ㉗ 790-350/790-398	12
U-shaped busbar, tin-plated  Cu 10 mm x 3 mm, for I/O 750 Series modules up to 8 modules ⑱ 790-191	25	insulated mounting foot  for busbar Cu 10 mm x 3 mm screw M4 x 8 mm gray ㉘ 790-100	50 (2x25)	busbar carrier with a T-connector, flexible  for busbar Cu 10 mm x 3 mm single side, angled, height 99 mm contact to TS 35 distance between center of TS 35 and busbar carrier: 70 mm ㉙ 790-352/790-398	12
U-shaped busbar, tin-plated  Cu 10 mm x 3 mm, for I/O 750 Series modules up to 5 modules ⑲ 790-192	25	insulated mounting foot  for busbar Cu 10 mm x 3 mm sheet metal screw 3,5 x 9 mm gray ㉚ 790-101	50 (2x25)	busbar carrier with a T-connector, flexible  for busbar Cu 10 mm x 3 mm single side, angled, height 56 mm contact to TS 35 distance between center of TS 35 and busbar carrier: 85 mm ㉛ 790-360/790-398	12
U-shaped busbar, tin-plated  Cu 10 mm x 3 mm, for I/O 750 Series modules up to 8 modules ㉔ 790-193	25	insulated mounting foot  for busbar Cu 10 mm x 3 mm no contact to TS 35 gray ㉜ 790-400	20	busbar carrier with a T-connector, flexible  for busbar Cu 10 mm x 3 mm single side, angled, height 99 mm contact to TS 35 distance between center of TS 35 and busbar carrier: 85 mm ㉝ 790-362/790-398	12
carrier with grounding foot for busbar TS 35, tin-coated  Cu 10 mm x 3 mm, busbar parallel to the rail length 15 mm ㉞ 790-110	25	busbar carrier  for busbar Cu 10 mm x 3 mm single side, straight contact to TS 35 distance between center of TS 35 and busbar carrier: 70 mm ㉟ 790-300	10	T-connector  for busbar Cu 10 mm x 3 mm busbar mounting position: vertical or horizontal to connect carrier with busbar ㊱ 790-398	10
carrier with grounding foot for busbar TS 35, tin-coated  Cu 10 mm x 3 mm, busbar parallel to the rail length 25 mm ㉟ 790-112	25	busbar carrier  for busbar Cu 10 mm x 3 mm single side, straight contact to TS 35 distance between center of TS 35 and busbar carrier: 80 mm ㊲ 790-302	10		
carrier with grounding foot for busbar TS 35, tin-coated  Cu 10 mm x 3 mm, busbar parallel to the rail length 45 mm ㊰ 790-114	25	busbar carrier  for busbar Cu 10 mm x 3 mm single side, straight contact to TS 35 distance between center of TS 35 and busbar carrier: 70 mm ㊳ 790-301	10		

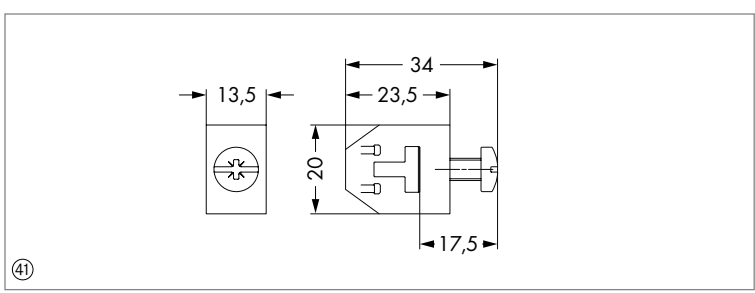
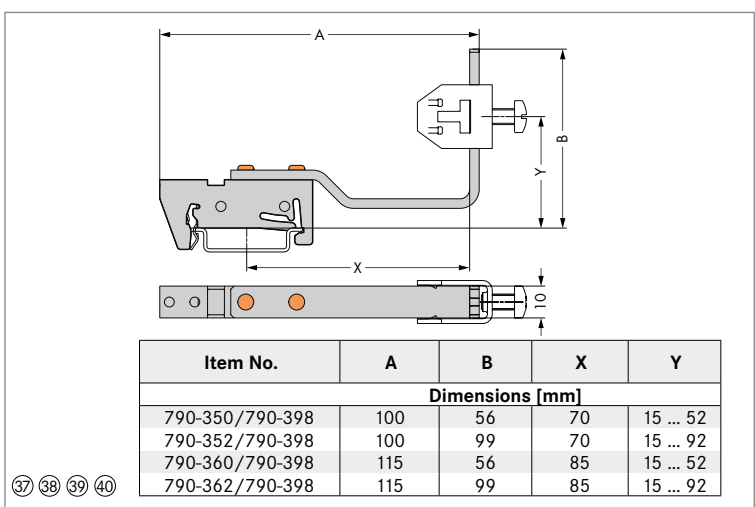
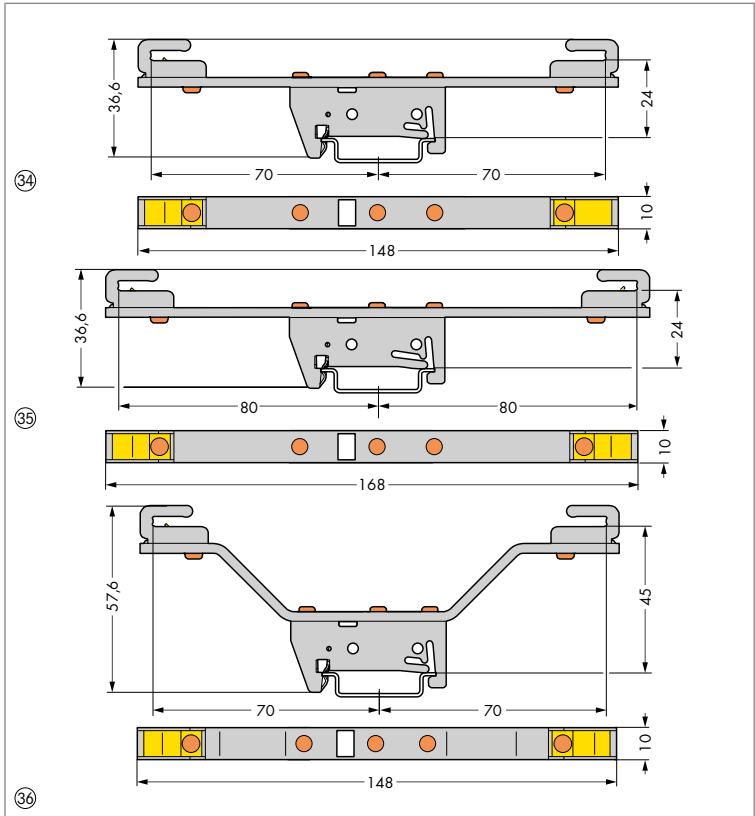
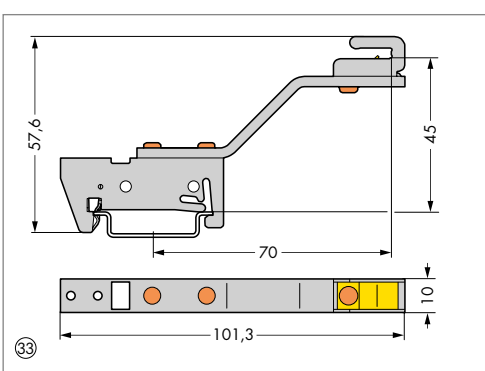
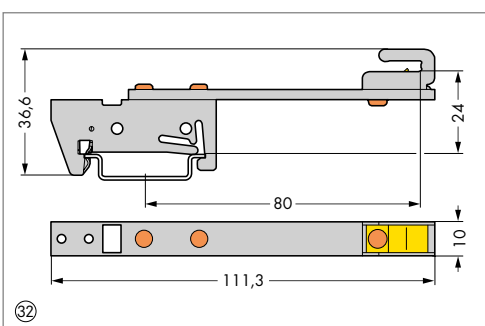
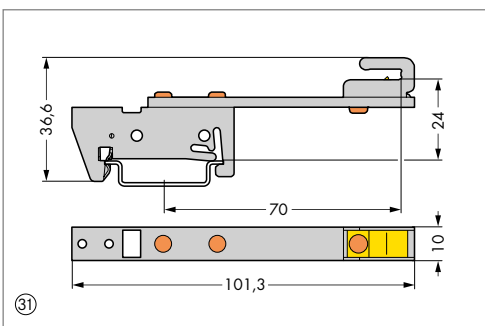
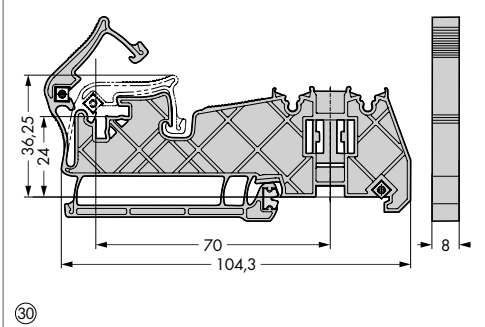
Accessories series 790 - dimensions



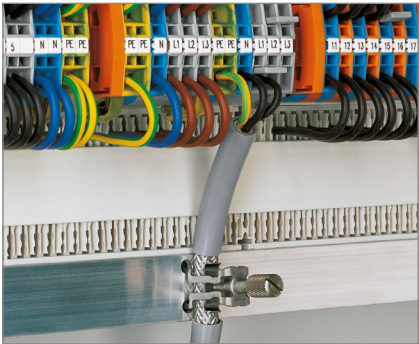
Dimensions [mm]

Item No.	A	B	C	Item No.	A	B	C
790-190	63	60	83	790-192	63	35	83
790-191	100	60	118	790-193	100	35	118

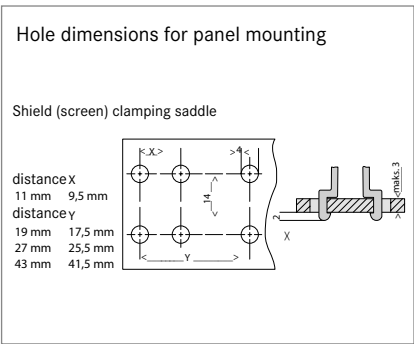
⑰ ⑱ ⑲ ⑳



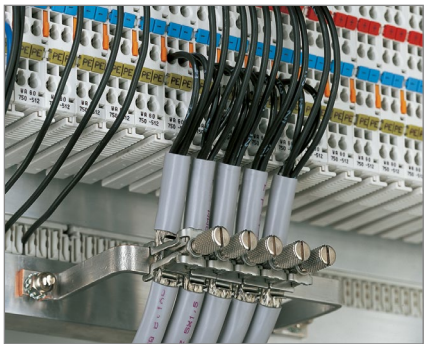
Different installation method - series 790



Snap shield clamping saddles into any metal plate (max. thickness: 3 mm)
 ④ ⑤ ⑥ ⑦



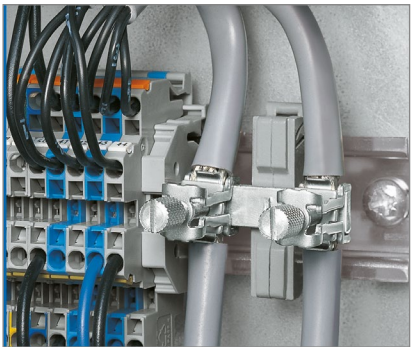
Distances [mm]
 ④ ⑤ ⑥ ⑦



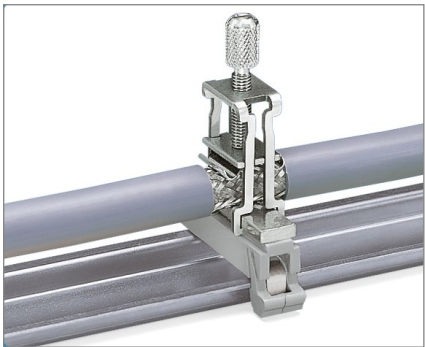
U-shaped (10 x 3) mm copper busbar
 ④ ⑤ ⑥ ⑦ 17 18 19 20



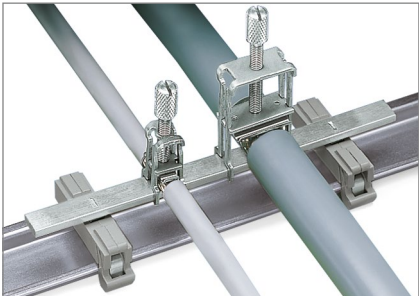
Insulated mounting carriers for a common shield reference potential, independent of housing potential
 ④ ⑤ ⑥ ⑦ 14 15 16 28 29



Carrier with grounding foot – busbar parallel to the rail TS 35
 ④ ⑤ ⑥ ⑦ 21 22 23



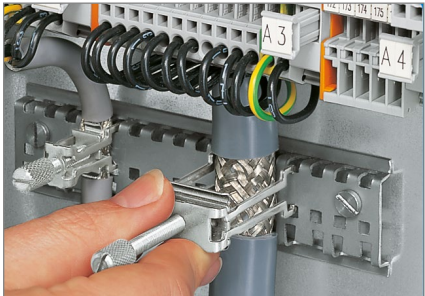
Carrier with grounding foot on busbar 90° to the rail TS 35
 ④ ⑤ ⑥ ⑦ 24



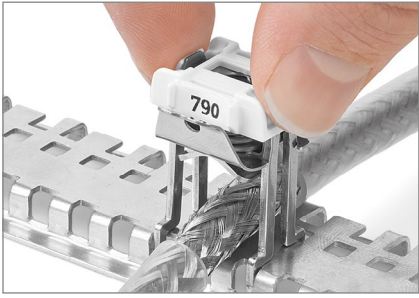
Carriers with 2 grounding feet on busbar parallel to the rail TS 35
 ④ ⑤ ⑥ ⑦ 25



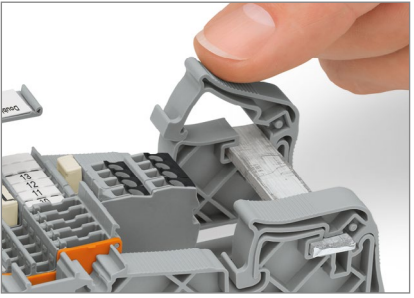
Fitting a spacer sleeve to a specially perforated carrier rail TS 35
 26 27



Fitting to a specially perforated carrier rail TS 35
 ④ ⑤ ⑥ ⑦ 26 27

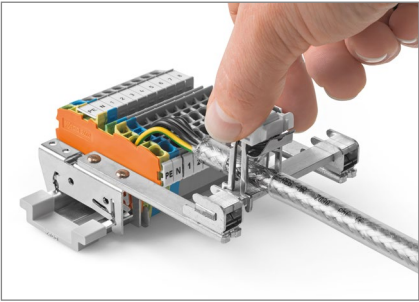


Fitting to a specially perforated carrier rail TS 35
 ① ② ③ 26 27



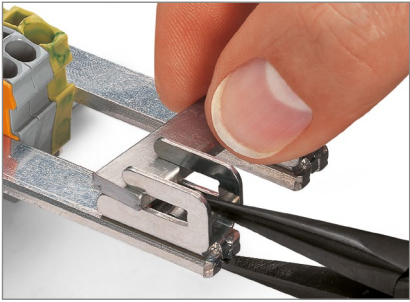
Fitting a busbar to an insulated carrier
 ④ ⑤ ⑥ ⑦ 30

Different installation method - series 790



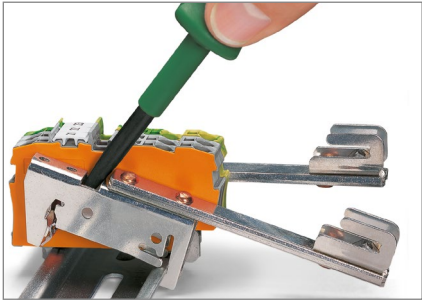
Fitting a spring shield clamping saddles to a busbar with single, straight metal carrier.

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫



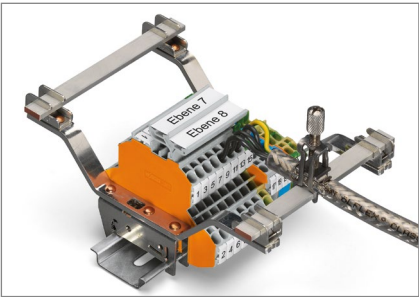
To remove the busbar, compress the spring using pliers

⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲



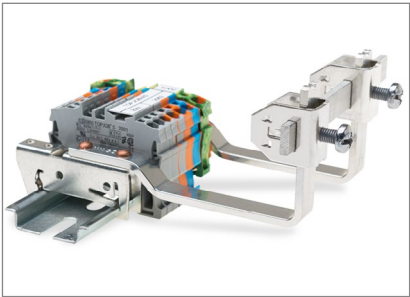
Remove the busbar carrier using an operating tool

⑳ ㉑



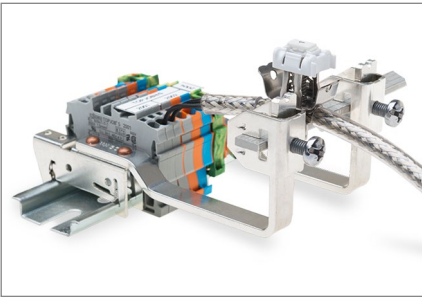
Screw shield clamping saddles on a horizontal busbar with both-side, angled metal carriers

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲



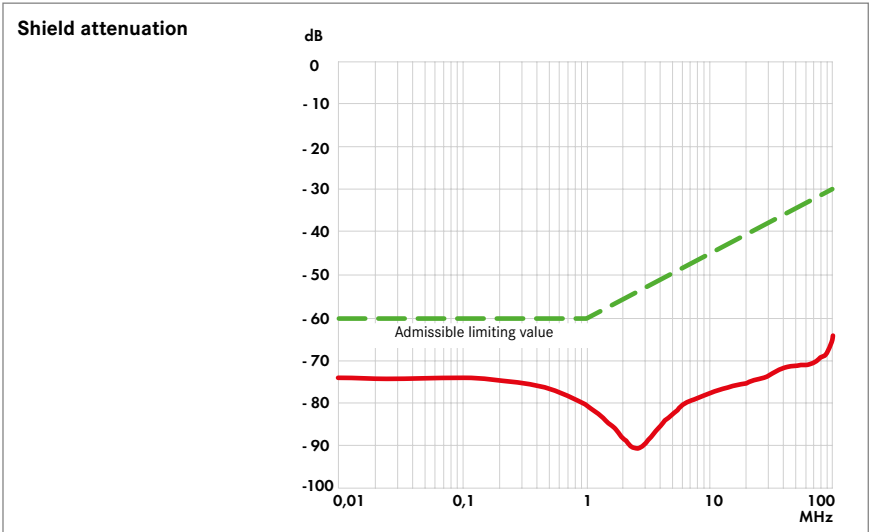
Vertical busbar with metal T-connector situated vertically with metal bearer to sliding t-holder

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲ ㉑ ㉒



Spring shield clamping saddles on a horizontal busbar with metal T-connector

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲ ㉑ ㉒ ㉓ ㉔



WAGO's shield connection system is highly effective because the clamping unit can be brought very close to the unshielded part of the cable.

ÖLFLEX® CLASSIC 100 CY



Colour-coded and screened PVC control cable



Benefits

- Space-saving installation due to small cable diameters
- High electrical performance due to 4 kV test voltage

Application range

- Plant engineering
Industrial machinery
Heating and air-conditioning systems
- Conveyor and transport systems
- Servo drives
- In EMC-sensitive environments (electromagnetic compatibility)

Product features

- Flame-retardant according IEC 60332-1-2
- Good chemical resistance, see catalogue appendix T1
- High degree of screening low transfer impedance (max. 250 Ω/km at 30 MHz)

Norm references / Approvals

- Based on IEC 60227-5 and EN 50525-2-51

Product Make-up

- Fine-wire strand made of bare copper wires
- PVC insulation LAPP P8/1
- Cores twisted in layers
- PVC inner sheath, grey
- Tinned-copper braiding
- PVC outer sheath, transparent

Technical Data

- Classification:**
ETIM 5.0 Class-ID: EC001578
ETIM 5.0 Class-Description: Flexible cable
- Core identification code:**
Up to 5 cores: colour-coded according to VDE 0293-308, refer to Appendix T9
- Conductor stranding:**
Fine wire according to VDE 0295, class 5/IEC 60228 class 5
- Minimum bending radius:**
Occasional flexing: 20 x outer diameter
Fixed installation: 6 x outer diameter
- Nominal voltage:**
Up to 1.0 mm²: U₀/U: 300/500 V
From 1.5 mm²: U₀/U: 450/750 V
Fixed, protected installation:
U₀/U: 600/1000 V
- Test voltage:**
4000 V
- Protective conductor:**
G = with GN-YE protective conductor
X = without protective conductor
- Temperature range:**
Occasional flexing: -5°C to +70°C
Fixed installation: -40°C to +80°C

Similar products

- ÖLFLEX® SERVO 9YSLCY-JB
- ÖLFLEX® SERVO 2YSLCY-JB

Accessories

- SKINTOP® BRUSH ADD-ON
- 3M Scotch™ 1183 screening tape
- SKINTOP® MS-M BRUSH

Info

- EMC-compliant

Article number	No. of cores and mm ² per conductor	Outer diameter [mm]	Copper index [kg/km]	Weight [kg/km]
ÖLFLEX® CLASSIC 100 CY; U₀/U: 300/500 V				
0035001	2 X 0,5	7,0	41	75
0035002	3 G 0,5	7,3	46	83
00350033	4 G 0,5	7,9	55	99
00352013	5 G 0,5	8,4	66	112
0035202	7 G 0,5	8,9	80	132
0035004	2 X 0,75	7,4	46	86
0035005	3 G 0,75	7,9	57	100
00350063	4 G 0,75	8,4	64	115
00350163	5 G 0,75	8,9	77	130
0035203	7 G 0,75	9,7	102	161
0035220	2 X 1,0	7,9	56	98
0035221	3 G 1,0	8,2	65	111
00352223	4 G 1,0	8,7	78	130
00352233	5 G 1,0	9,5	89	153
0035204	7 G 1,0	10,2	113	185
ÖLFLEX® CLASSIC 100 CY; U₀/U: 450/750 V				
0035000	2 X 1,5	9,9	65	132
0035458	3 G 1,5	10,3	79	170
00354593	4 G 1,5	11,3	97	204
00354603	5 G 1,5	12,6	116	246
0035461	7 G 1,5	13,9	149	320
0035011	3 G 2,5	11,8	146	211
00350173	4 G 2,5	13,5	167	310
00350123	5 G 2,5	14,6	200	326

Article number	No. of cores and mm ² per conductor	Outer diameter [mm]	Copper index [kg/km]	Weight [kg/km]
0035289	7 G 2,5	15,9	288	444
00350183	4 G 4	15,1	237	403
00350133	5 G 4	16,5	328	478
00350193	4 G 6	16,6	318	521
00350143	5 G 6	18,2	441	624
0034953	3 G 10	18,9	414	690
00350213	4 G 10	21,1	558	843
00352903	5 G 10	23,1	714	1004
0034954	3 G 16	21,7	607	910
00350223	4 G 16	23,9	804	1164
00350153	5 G 16	26,8	1050	1812
0034955	3 G 25	26,6	936	1330
00350233	4 G 25	29,4	1289	1903
00350243	5 G 25	32,6	1446	2374
0034956	3 G 35	29,4	1258	1370
00350253	4 G 35	32,4	1693	2489
00350263	5 G 35	36,0	1975	2771
0034952	3 G 50	35,1	1748	2590
00350273	4 G 50	38,8	2342	3362
00350283	4 G 70	43,7	3035	3719
00350293	4 G 95	50,4	4055	5849
00354303	4 G 120	56,8	5225	7509
00354313	4 G 150	62,2	6300	7800
00354323	4 G 185	67,8	7753	9866

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request. Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges. Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum. Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils). Single lengths for sizes: ≥ 4G50 max. 500 m; ≥ 4G95 max. 400 m; ≥ 4G120 max. 300 m; ≥ 4G150 max. 250 m Photographs and graphics are not to scale and do not represent detailed images of the respective products.

Prices are net prices without VAT and surcharges. Sale to business customers only.

ÖLFLEX® CLASSIC 110 CY



Screened PVC control cable with transparent outer sheath

Benefits

- Space-saving installation due to small cable diameters
- High electrical performance due to 4 kV test voltage

Application range

- Plant engineering
Industrial machinery
Heating and air-conditioning systems
- Conveyor and transport systems
- In EMC-sensitive environments (electromagnetic compatibility)

Product features

- Flame-retardant according IEC 60332-1-2
- Good chemical resistance, see catalogue appendix T1
- High degree of screening low transfer impedance (max. 250 Ω/km at 30 MHz)

Norm references / Approvals

- VDE reg. no. 7030

Product Make-up

- Fine-wire strand made of bare copper wires
- PVC insulation LAPP P8/1
- Cores twisted in layers
- PVC inner sheath, grey
- Tinned-copper braiding
- PVC outer sheath, transparent

Technical Data

Classification:
ETIM 5.0 Class-ID: EC000104
ETIM 5.0 Class-Description: Control cable

Core identification code:
Black with white numbers acc. to VDE 0293-1

Conductor stranding:
Fine wire according to VDE 0295, class 5/IEC 60228 class 5

Minimum bending radius:
Occasional flexing: 20 x outer diameter
Fixed installation: 6 x outer diameter

Nominal voltage:
U₀/U: 300/500 V

Test voltage:
4000 V

Protective conductor:
G = with GN-YE protective conductor
X = without protective conductor

Temperature range:
Occasional flexing: -5°C to +70°C
Fixed installation: -40°C to +80°C

Info

- EMC-compliant
- VDE reg. no. 7030



Article number	No. of cores and mm ² per conductor	Outer diameter [mm]	Copper index [kg/km]	Weight [kg/km]
ÖLFLEX® CLASSIC 110 CY				
1135752	2 X0,5	7,0	41	75
1135003	3 G0,5	7,3	45,5	83
1135753	3 X0,5	7,3	45,5	83
1135004	4 G0,5	7,9	55	99
1135754	4 X0,5	7,9	55	99
1135005	5 G0,5	8,4	66	112
1135755	5 X0,5	8,4	66	112
1135007	7 G0,5	8,9	80,5	132
1135757	7 X0,5	8,9	80,5	132
1135012	12 G0,5	11,3	138,5	202
1135762	12 X0,5	11,3	138,5	202
1135018	18 G0,5	13,3	156,4	289
1135025	25 G0,5	15,2	250	378
1135030	30 G0,5	16,1	297	429
1135040	40 G0,5	18,2	343	542
1135802	2 X0,75	7,4	46	86
1135103	3 G0,75	7,9	57,9	100
1135803	3 X0,75	7,9	57,9	100
1135104	4 G0,75	8,4	64	115
1135804	4 X0,75	8,4	64	115
1135105	5 G0,75	8,9	77,4	130
1135805	5 X0,75	8,9	77,4	130
1135107	7 G0,75	9,7	102	161
1135807	7 X0,75	9,7	102	161
1135112	12 G0,75	12,3	177	247
1135812	12 X0,75	12,3	177	247
1135118	18 G0,75	14,5	243	356
1135818	18 X0,75	14,5	243	356
1135125	25 G0,75	16,6	307,3	465
1135134	34 G0,75	18,9	323,2	601
1135840	40 X0,75	20,5	369,4	734
1135141	41 G0,75	20,6	488	728
1135852	2 X1,0	7,9	56	98
1135203	3 G1,0	8,2	65,3	111
1135853	3 X1,0	8,2	65,3	111
1135204	4 G1,0	8,7	78,1	130
1135854	4 X1,0	8,7	78,1	130
1135205	5 G1,0	9,5	89,4	153
1135207	7 G1,0	10,2	113,3	185
1135212	12 G1,0	13,3	188,1	307
1135216	16 G1,0	14,6	216	390
1135218	18 G1,0	15,5	286	418
1135225	25 G1,0	17,5	388,5	544

Article number	No. of cores and mm ² per conductor	Outer diameter [mm]	Copper index [kg/km]	Weight [kg/km]
1135234	34 G1,0	20,3	505	738
1135241	41 G1,0	22,0	578	864
1135250	50 G1,0	23,8	688	1011
1135902	2 X1,5	8,5	65	117
1135303	3 G1,5	8,9	83	136
1135903	3 X1,5	8,9	83	136
1135304	4 G1,5	9,6	100	163
1135904	4 X1,5	9,6	100	163
1135305	5 G1,5	10,3	125	188
1135905	5 X1,5	10,3	125	188
1135307	7 G1,5	11,3	149	237
1135907	7 X1,5	11,3	149	237
1135312	12 G1,5	14,8	280	393
1135318	18 G1,5	17,2	389	538
1135325	25 G1,5	20,1	535	745
1135334	34 G1,5	22,8	702	964
1135341	41 G1,5	24,7	844,6	1123
1135350	50 G1,5	27,1	1006	1372
1135402	2 X2,5	9,9	112	165
1135403	3 G2,5	10,3	146	192
1135404	4 G2,5	11,3	167	233
1135405	5 G2,5	12,6	200	283
1135407	7 G2,5	13,9	288	371
1135412	12 G2,5	17,6	477,3	585
1135502	2 X4	11,4	120	247
1135504	4 G4	13,4	237	347
1135505	5 G4	14,7	280	413
1135602	2 X6	13,6	180	353
1135604	4 G6	15,8	318	485
1135605	5 G6	17,3	441	702
1135607	7 G6	18,8	530	950
1135702	2 X10	16,4	256	492
1135615	3 G10	17,4	362,4	507
1135614	4 G10	19,0	518	735
1135616	5 G10	21,3	595	847
1135617	7 G10	23,2	796	1039
1135622	2 X16	18,6	390	698
1135624	4 G16	22,2	804	1395
1135623	5 G16	24,4	935	1440
1135626	4 G25	26,9	1161	1730
1135627	5 G25	30,0	1400	2090
1135625	4 G35	30,2	1543	2210
1135628	5 G35	33,2	1901	2710

ÖLFLEX® SERVO 2YSLCY-JB



EMC-optimised motor cable, low-capacitance, double shielded

Benefits

- EMC-compliant installation of speed-controlled electrical drives compliant with EN 61800-3
- High power transmission for large drives
- Longer cable connection possible between frequency converter and motor due to low capacitance design
- Ground-symmetrical 3+3 version supports the reduction of bearing currents
- Versions with black outer sheath are suitable for outdoor use

Application range

- Connecting cable between frequency converter and motor
- In dry, damp or wet interiors
- Paper industry
- Chemical industry
- Heavy industry

Product features

- Flame-retardant according IEC 60332-1-2

Norm references / Approvals

- Based on VDE 0207 / 0250 / 0295

Product Make-up

- Fine-wire, bare copper conductor
- Core insulation: PE
- Cores twisted concentrically (protective conductor is symmetrically divided into three parts for the 3+3 version and is split between the power cores in terms of the interstice filler)
- Screening: Aluminium-laminated foil wrapping combined with tin-plated copper braiding
- 4-core version: Optional transparent or black PVC outer sheath
- 3+3 core version: PVC outer sheath, black – flexible at low temperatures

Info

- EMC-optimised design
- 4-core design in transparent and black
- 3+3 symmetry reduces common-mode interferences

Technical Data

- Classification:**
ETIM 5.0 Class-ID: EC000057
ETIM 5.0 Class-Description: Low voltage power cable
- Core identification code:**
Coloured according to HD 308 S2 VDE 0293-308
- Conductor stranding:**
Fine wire according to VDE 0295 Class 5 / IEC 60228 Class 5
- Minimum bending radius:**
Occasional flexing: 15 x outer diameter
Fixed installation: 4 x outer diameter
- Nominal voltage:**
U₀/U: 600/1000 V
- Test voltage:**
Core/Core: 4 kV
Core/Shield: 4 kV
- Protective conductor:**
G = with GN-YE protective conductor
X = without protective conductor
Protective conductor of 3+3 version is split between the power cores in terms of the interstice filler
- Temperature range:**
Flexing: -5 °C to +70 °C
3+3 core version: -15 °C to +70 °C
Fixed installation: -40 °C to +70 °C



Article number	No. of cores and mm ² per conductor	Outer diameter [mm]	Copper index [kg/km]	Weight [kg/km]
ÖLFLEX® SERVO 2YSLCY-JB / 4-core version - transparent outer sheath				
0036425	4 G 1,5	11,4	95	230
0036426	4 G 2,5	12,4	150	300
0036427	4 G 4	15,6	235	485
0036428	4 G 6	17,0	320	630
0036429	4 G 10	19,6	533	860
0036430	4 G 16	22,1	789	1290
0036431	4 G 25	26,3	1236	1860
0036432	4 G 35	29,5	1662	2610
0036433	4 G 50	35,8	2345	2950
0036434	4 G 70	40,3	3196	3950
0036435	4 G 95	46,5	4316	5300
0036436	4 G 120	53,2	5435	6600
0036437	4 G 150	57,3	6394	7043
0036438	4 G 185	62,3	7639	8384
ÖLFLEX® SERVO 2YSLCY-JB BK / 4-core version - black outer sheath				
1136450	4 G 1,5	11,4	95	230
1136451	4 G 2,5	12,4	150	300
1136452	4 G 4	15,6	235	485
1136453	4 G 6	17,0	320	630
1136454	4 G 10	19,6	533	860
1136455	4 G 16	22,1	789	1290
1136456	4 G 25	26,3	1236	1860

Article number	No. of cores and mm ² per conductor	Outer diameter [mm]	Copper index [kg/km]	Weight [kg/km]
1136457	4 G 35	29,5	1662	2610
1136458	4 G 50	35,8	2345	2950
1136459	4 G 70	40,3	3196	3950
1136460	4 G 95	46,5	4316	5300
1136461	4 G 120	53,2	5435	6600
1136462	4 G 150	57,3	6394	7043
1136463	4 G 185	62,3	7639	8384
ÖLFLEX® SERVO 2YSLCYK-JB / 3+3 core version - black outer sheath, flexible at cold temperatures				
0036439	3 X 1,5 + 3 G 0,25	11,4	88	140
0036440	3 X 2,5 + 3 G 0,5	12,2	144	220
0036441	3 X 4 + 3 G 0,75	14,4	224	323
0036442	3 X 6 + 3 G 1,0	15,7	276	420
0036443	3 X 10 + 3 G 1,5	18,0	491	615
0036444	3 X 16 + 3 G 2,5	20,2	723	819
0036445	3 X 25 + 3 G 4	23,8	1136	1325
0036446	3 X 35 + 3 G 6	26,9	1535	1718
0036447	3 X 50 + 3 G 10	32,6	2156	2399
0036448	3 X 70 + 3 G 10	36,4	2871	3056
0036449	3 X 95 + 3 G 16	42,0	3953	4162
0036450	3 X 120 + 3 G 16	47,8	4836	5074
0036451	3 X 150 + 3 G 25	51,6	5412	6128
0036479	3 X 185 + 3 G 35	56,5	7041	7500
0036453	3 X 240 + 3 G 50	65,1	8986	9770

Similar products

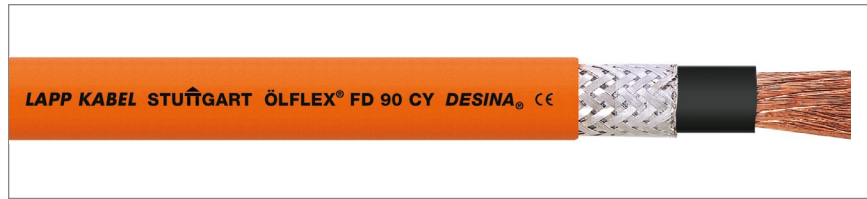
- ÖLFLEX® SERVO 9YSLCY-JB

Accessories

- SKINTOP® BRUSH ADD-ON
- SKINTOP® MS-SC-M
- SKINTOP® MS-M BRUSH

ÖLFLEX® FD 90 CY

Highly flexible, screened single core cable with PVC insulation and PVC sheath - certified for North America



Technical Data

	Klassifikation: ETIM 5.0 Class-ID: EC000057 ETIM 5.0 Class-Description: Low voltage power cable
	Core identification code: Black, other colours are available upon request
	Conductor stranding: Extra-fine wire according to VDE 0295, class 6/IEC 60228 class 6
	Minimum bending radius: For flexible use: 7,5 x outer diameter Fixed installation: 3 x outer diameter
	Nominal voltage: IEC: U_0/U 600/1000 V UL & CSA: 600 V
	Test voltage: 4000 V
	Alternating bending cycles: 5 million cycles
	Temperature range: Flexing: -5°C to +90°C (UL/CSA) Fixed installation: -40°C to +90°C (UL/CSA)

Benefits

- Multi-standard certification reduces part varieties and saves costs
- For various applications
- Also suitable for fixed installation where space is limited
- Copper screening complies with EMC requirements and protects against electromagnetic interference

Application range

- In power chains or moving machine parts
- For internal wiring of electric and electronic equipment in switch cabinets
- Specially designed for power circuits of servomotors driven by frequency converters
- This cable can substitute screened multi-core motor cables where space requirements or minimum bending radii cause problems
- Test systems in the automotive industry, vehicles and stationary fuel cell systems

Product features

- Designed for 5 million alternating bending cycles and travel distances up to 10 meter
- Flame-retardant according to IEC 60332-1-2 & CSA FT 1
- High oil-resistance
- Low-adhesive surface
- EMC-compliant

Norm references / Approvals

- Based on VDE 0250 / 0285
- UL-AWM-Style 10107, cRU AWM II A/B FT 1 $\geq 150\text{mm}^2$
- CSA AWM IA/B IIA/B FT 1 $\leq 120\text{mm}^2$
- UL File No. E63634
- For use in power chains: Please comply with assembly guideline Appendix T3

Product Make-up

- Extra-fine wire strand made of bare copper wires (class 6)
- Non-woven wrapping
- Core insulation: PVC
- Tinned-copper braiding
- PVC outer sheath, orange (RAL 2003)

Info

- Core Line for ordinary duty in power chain applications
- AWM certification for USA and Canada
- EMC compliant copper screening

Article number	Conductor cross-section [mm ²]	Outer diameter [mm]	Copper index [kg/km]	Weight [kg/km]
ÖLFLEX® FD 90 CY				
0026651	10	9,7	127,6	227
0026653	16	11,2	186,2	297
0026655	25	12,5	257,8	410
0026657	35	15,1	400,7	607
0026659	50	17,1	554,8	808
0026661	70	19,4	775,6	1081
0026663	95	20,9	1028,1	1382
0026665	120	24,5	1282,4	1752
0026667	150	26,2	1578	1924
0026669	185	29,2	1935	2611
0026671	240	32,9	2526	3372
0026673	300	34,8	3128,8	4105

Unless specified otherwise, the shown product values are nominal values at room temperature. Detailed values (e.g. tolerances) are available upon request.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil $\leq 30\text{ kg}$ or $\leq 250\text{ m}$, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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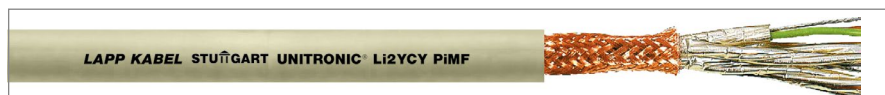
Accessories

- SKINTOP® BRUSH ADD-ON
- SKINTOP® MS-M BRUSH
- SILVYN® CHAIN Protective cable conduit systems and cable carrier systems

UNITRONIC® Li2YCY PiMF



Screened data transmission cable with PE core insulation and pairs in metalfoil



Benefits

- Data transmission cable with low capacitance, pair screening and overall copper braiding
- Particularly suitable for wiring data systems and controls in large industrial plants
- 7-wire stranded conductor can be used for Maxi TERMI-POINT® wiring
- Individually screened pairs and the overall braid minimise electrical interference
- Decoupling of circuits by means of twisted-pair (TP) design (crosstalk effects)

Application range

- For enhanced requirements in near-end cross-talk attenuation and high electrical interference in the circuits
- Suitable for the transmission with varying in frequency and voltage or sensitive signals
- Can be used multifunctional in electronics of computer systems, electronic control equipment, office machines, balances, etc.
- For measurement value transmission and serial 2-wire interfaces
- Intended for limited flexible use, and for fixed installation in dry or damp interiors

Product features

- Flame-retardant according IEC 60332-1-2

Product Make-up

- 7-wire or fine-wire (from 1 mm²) strands made of bare copper wires
- Core insulation made of polyethylene (PE)
- Cores twisted into pairs
- Foil wrapping, static screening made of aluminium-laminated plastic film with copper drain wire for each pair
- Bare copper screen braiding
- Outer sheath made of PVC
- Outer sheath colour: pebble grey (RAL 7032)

Info

- Metal foil screened pairs

Technical Data



Klassifikation:

ETIM 5.0 Class-ID: EC000104
 ETIM 5.0 Class-Description:
 Control cable
 ETIM 6.0 Class-ID: EC000104
 ETIM 6.0 Class-Description:
 Control cable



Core identification code:

0.22 mm²-0.5 mm²:
 according to DIN 47100, see table T9
 1.0 mm²:
 a-core: white, b-core: black



Mutual capacitance:

At 800 Hz:
 0.22 mm²: max. 70 nF/km
 0.34 mm²: max. 70 nF/km
 0.5 mm²: max. 75 nF/km
 1.0 mm²: max. 85 nF/km



Peak operating voltage:

(not for power applications) 250 V



Inductivity:

Approx. 0.4 mH/km



Conductor stranding:

Stranded conductor, based on
 VDE 0881, 7-wire



Minimum bending radius:

Occasional flexing: 20 x outer diameter
 Fixed installation: 10 x outer diameter



Test voltage:

Core/core: 2000 V
 Core/screen: 1000 V



Characteristic impedance:

approx. 85 Ohm (> 1 MHz)



Temperature range:

Occasional flexing: -5°C to +70°C
 Fixed installation: -40°C to +80°C

Article number	Number of pairs and mm ² per conductor	Outer diameter [mm]	Copper index [kg/km]	Weight [kg/km]
UNITRONIC® Li2YCY PiMF 7-wire				
0034040	2 x 2 x 0,22	7,7	33	75,4
0034041	3 x 2 x 0,22	8,1	42	86
0034042	4 x 2 x 0,22	8,7	50	99
0034043	8 x 2 x 0,22	10,9	85	161,4
0034044	10 x 2 x 0,22	12,5	100	186,4
0034045	2 x 2 x 0,34	9	43	70
0034046	3 x 2 x 0,34	9,4	55	85
0034047	4 x 2 x 0,34	9,8	64	103
0034048	8 x 2 x 0,34	12,9	127	191
0034060	2 x 2 x 0,5	9,9	51	96
0034061	3 x 2 x 0,5	10,4	66	116
0034062	4 x 2 x 0,5	11,3	71	141
0034063	5 x 2 x 0,5	11,8	92	180
0034064	8 x 2 x 0,5	14,5	153	271
0034065	10 x 2 x 0,5	16,6	182	327
Fine wire				
0034070	2 x 2 x 1	9,9	82	126
0034071	3 x 2 x 1	11,8	109	156
0034072	4 x 2 x 1	12,7	133	193
0034073	10 x 2 x 1	19,7	326	492

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.

Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

TERMI-POINT® is a registered trademark of AMP

Photographs and graphics are not to scale and do not represent detailed images of the respective products.

HITRONIC® POF cables for PROFINET Applications



Benefits

- Optical data transmission up to 70m
- Easy to handle
- No interference by external fields
- No grounding problems
- Suitable for direct connector assembly

Application range

- For optical signal transmission in industrial applications
- PROFINET / Industrial Ethernet
- At 100 Mbit/s: max 50 m cable length
- PROFINET type B: for fixed laying
- PROFINET type C: for flexible applications (power chains)

Product features

- Cable version with PVC outer sheath: for standard applications in industrial environments
- Cable version with PUR outer sheath: for high mechanical or chemical stress in industrial environments
- PNB - PROFINET-Type B
- PNC - PROFINET-Type C
- FD - Highly flexible (power chains)

Product Make-up

- Polymer Optical Fibre (POF)
- PA buffer tube
- Fibre colour coding: black, orange (with arrow printing)
- Aramid yarns as strain relief
- Outer sheath material PUR or PVC (see article description)
- Outer sheath colour: green (RAL 6018)

Technical Data

- ETIM 5.0 Class-ID:** EC000034
ETIM 5.0 Class-Description: Fibre optic cable
- ETIM 6.0 Class-ID:** EC000034
ETIM 6.0 Class-Description: Fibre optic cable
- Dimensions:**
Buffered fibre: 2.2 mm
Cable: see table
- Core identification code:**
Black, orange (with arrow printing)
- Standard designation:**
Core material: PMMA
Cladding material: fluoropolymers
- Permissible bending radius:**
≥ 10 x outer diameter
- Permissible tensile force:**
see data sheet
- Temperature range:**
Operation: -20°C to +70°C
Installation: -10°C to +50°C

Info

- PROFINET compliant - Type B or Type C
- J-V4Y(ZN)11Y 2P980/1000
- J-V4Y(ZN)Y 2P980/1000
- J-V4Y(ZN)11Y 2P980/1000 flex



Article number	Article designation	Fibre type	Number of fibres	Outer diameter [mm]	Weight [kg/km]
POF DUPLEX - PROFINET TYPE B					
28051002	HITRONIC® POF DUPLEX PNB PA-PUR	980/1000 POF	2	8	56
28052002	HITRONIC® POF DUPLEX PNB PA-PVC	980/1000 POF	2	7,8	59
POF DUPLEX - PROFINET TYPE C					
28351002	HITRONIC® POF DUPLEX FD PNC PA-PUR	980/1000 POF	2	8	55

Similar products

- HITRONIC® PCF cables for PROFINET Applications

Accessories

- POF Assembly Sets
- POF Cutting Tools
- POF Connector F-SMA and ST(BFOC)
- POF Connector SC-RJ
- EPIC® DATA PB Sub-D FO
- STAR STRIP stripping tool

SKINTOP® MS-M BRUSH



Benefits

- Optimum, low-resistance 360° screen contact
- Faster than any other comparable system
- Uncomplicated and reliable
- Maximum assembly freedom during adjustment

Application range

- For EMC-compliant earthing of the copper braiding, or for cables with copper shaft sheath
- Automation systems
- High-power drives
- Frequency converters
- Conveyor and transport systems

Norm references / Approvals

- UL File Nr. E79903

Product Make-up

- Metric connection thread acc. to DIN EN 60423
- Basis for technical information DIN IEC 62444

Note

- SKINDICHT® SM-PE-M counter nut should be used to ensure optimum contact with painted, anodised or powder-coated housings

Technical Data



Classification:

ETIM 5.0 Class-ID: EC000441
 ETIM 5.0 Class-Description: Cable screw gland
 ETIM 6.0 Class-ID: EC000441
 ETIM 6.0 Class-Description: Cable screw gland



Caution:

Refer to Appendix T21 for the installation dimensions and torques



Approvals:

VDE, UL, CSA, DNV approval for size M90 x 2 and 110 x 2 pending



Material:

Body: nickel-plated brass
 Cap nut: nickel-plated brass
 Insert: polyamide
 EMC brush: brass wire
 Sealing ring: elastomer
 O-ring: elastomer



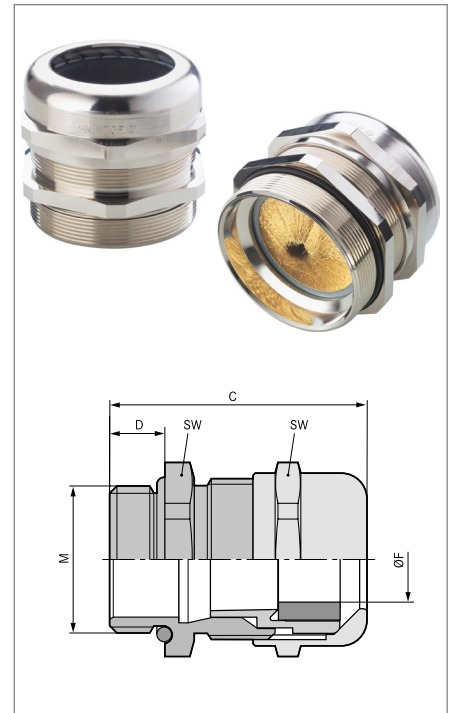
Protection rating:

IP 68 - 10 bar (M12 - M110)
 IP 69 (M12 - M63)



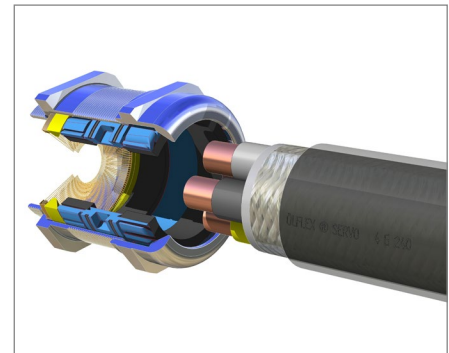
Temperature range:

dynamic -25°C up to + 100°C
 Fixed: -40°C to +100°C



Info

- SKINTOP® MS-M BRUSH sizes 75 x 1.5 to 110 x 2 with innovative double lamella gasket for easier assembling of cables with large diameters.



Article number	Article designation / size	Outer Ø [mm], from - to	Minimum Ø above braiding [mm]	SW wrench size [mm]	Thread length, D [mm]	Pieces / PU
SKINTOP® MS-M BRUSH						
53112676	25 x 1,5	9,0 - 17,0	6	29	8	10
53112677	32 x 1,5	11,0 - 21,0	8	36	9	5
53112678	40 x 1,5	19,0 - 28,0	10	45	9	5
53112679	50 x 1,5	27,0 - 35,0	14	54	10	5
53112680	63 x 1,5	34,0 - 45,0	20	67	15	1
53112681	63 x 1,5 plus	44,0 - 55,0	25	75	15	1
53112501	75 x 1,5	53,0 - 63,0	35	95	15	1
53112500	75 x 1,5 plus	58,0 - 68,0	35	95	15	1
53112503	90 x 2	66,0 - 78,0	45	115	20	1
53112505	110 x 2	76,0 - 88,0	55	135	25	1
53112504	110 x 2 plus	86,0 - 98,0	55	135	25	1

Similar products

- SKINTOP® MS-M ATEX BRUSH

Accessories

- SKINDICHT® SM-PE-M

SKINTOP® BRUSH ADD-ON



Benefits

- Optimum, low-resistance 360° screen contact
- Cutting edges cut through the insulating layer of the housing or switch cabinets, thus guaranteeing an optimum EMC contact
- Easy disassembling
- Visible, large-scale screen contact
- Uncomplicated and reliable

Application range

- For EMC-compliant earthing of the copper braiding, or for cables with copper shaft sheath
- For EMC-contact at through bore-holes
- Control cabinet manufacturing
- Automation systems
- Conveyor and transport systems

Product Make-up

- Metric connection thread acc. to DIN EN 60423
- Basis for technical information DIN IEC 62444

Technical Data



Classification:

ETIM 5.0 Class-ID: EC000441
ETIM 5.0 Class-Description: Cable screw gland
ETIM 6.0 Class-ID: EC000441
ETIM 6.0 Class-Description: Cable screw gland



Caution:

Refer to Appendix T21 for the installation dimensions and torques
Apply SKINTOP® ST-M torques



Certifications:

UL pending



Material:

Body: nickel-plated brass
EMC brush: brass



Temperature range:

Dynamic: -20°C to +100°C
Depending on the combination of the used cable gland



Info

- Innovative EMC add-on for SKINTOP® ST(R)-M polyamide cable glands.
- Worlds first patented active EMC lock-nut!



Article number	Article designation / size	Minimum Ø above braiding [mm]	SW wrench size [mm]	Thread length, D [mm]	Pieces / PU
SKINTOP® BRUSH ADD-ON					
54110839	M 12 x 1,5	4	24	10	25
54110840	M 16 x 1,5	5	24	10	25
54110841	M 20 x 1,5	5	24	10	10
54110842	M 25 x 1,5	5	30	10	10
54110843	M 32 x 1,5	8	39	12	10
54110844	M 40 x 1,5	10	47	12	5
54110845	M 50 x 1,5	14	56	12	5
54110846	M 63 x 1,5	14	63	12	1

Accessories

- SKINTOP® BS-M
- SKINTOP® ST-M
- SKINTOP® STR-M
- SKINTOP® ST-HF-M
- SKINTOP® COLD
- SKINTOP® COLD-R

SKINTOP® MS-SC-M



Benefits

- Low-resistance screen contact, optimum EMC protection
- Suitable for cables with and without inner sheath
- Also suitable for continuing the cable screen to another connection
- Highly conductive, flexible EMC contact for clamping various screen diameters
- Few operation steps, easy to assemble

Application range

- For EMC-compliant earthing of the copper braiding, or for cables with copper shaft sheath
- Telecommunication
- Industrial machinery and plant engineering
- Measurement and control technology
- Automation technology

Norm references / Approvals

- UL File Nr. E79903

Product Make-up

- Metric connection thread acc. to DIN EN 60423
- Basis for technical information DIN IEC 62444

Note

- SKINDICHT® SM-PE-M counter nut should be used to ensure optimum contact with painted, anodised or powder-coated housings
- Refer to SKINTOP® metric accessories for suitable accessories
- As an alternative for thick-walled housings, we recommend SKINTOP® MS-SC-M-XL with long connection thread in the sizes M16 to M50

Technical Data



Classification:

ETIM 5.0 Class-ID: EC000441
ETIM 5.0 Class-Description: Cable screw gland
ETIM 6.0 Class-ID: EC000441
ETIM 6.0 Class-Description: Cable screw gland



Caution:

Refer to Appendix T21 for the installation dimensions and torques



Note

In stainless steel V2A available



Material:

Body: nickel-plated brass
Insert: polyamide
Sealing: CR
O-ring: NBR



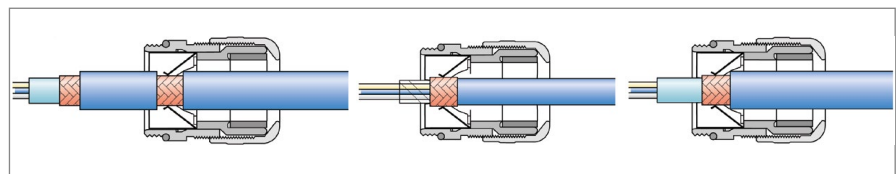
Protection rating:

IP 68 - 10 bar



Temperature range:

dynamic -25°C up to + 100°C
static -40°C up to + 100°C



Article number	Article designation / size	Outer Ø [mm], from - to	Minimum Ø above braiding [mm]	SW wrench size [mm]	Thread length, D [mm]	Pieces / PU
SKINTOP® MS-SC-M						
53112610	12 x 1,5	3,5 - 7,0	2	16	6,5	50
53112620	16 x 1,5	4,5 - 9,0	4	20	7	50
53112630	20 x 1,5	7,0 - 12,5	5	24	8	25
53112640	25 x 1,5	9,0 - 16,5	7,5	29	8	25
53112650	32 x 1,5	11,0 - 21,0	9	36	9	25
53112660	40 x 1,5	19,0 - 28,0	15	45	9	10
53112670	50 x 1,5	27,0 - 35,0	21	54	10	5
SKINTOP® MS-SC-M-XL						
53112625	16 x 1,5	4,5 - 9,0	4	20	12	50
53112635	20 x 1,5	7,0 - 12,5	5	24	12	25
53112645	25 x 1,5	9,0 - 16,5	7,5	29	12	25
53112655	32 x 1,5	11,0 - 21,0	9	36	15	25
53112665	40 x 1,5	19,0 - 28,0	15	45	15	10
53112675	50 x 1,5	27,0 - 35,0	21	54	15	5

Similar products

- SKINTOP® INOX SC

Accessories

- SKINDICHT® SM-PE-M

SILVYN® EMC AS-CU



Benefits

- Optimum EMC protection
- High-tensile
- High crush-resistance
- Flexible
- High mechanical resistance

Application range

- Mechanical engineering
- Automotive industry
- Conveyor technology
- Railway applications / vehicle construction
- Used in areas where electromagnetic interferences can occur

Product features

- According to EN 50289-1-6, a screening factor from 30 MHz up to 80 dB can be reached

Product Make-up

- Helically-wound metal protective conduit with interlocked profile
- Tinned-copper braiding

Technical Data



ETIM 5.0 Class-ID: EC001179
 ETIM 5.0 Class-Description: Protective metallic hose
 ETIM 6.0 Class-ID: EC001179
 ETIM 6.0 Class-Description: Protective metallic hose



Certifications:
 IEC EN 61386-23



Material:
 Inner conduit: galvanized steel
 Braiding: tinned copper wire



Temperature range:
 -50°C to +250°C



Article number	Nominal size	ID x OD [mm]	Bending radius [mm]	Suitable for SILVYN® MSK-M	Suitable for SILVYN® US-M	Suitable for SILVYN® US	PU ring in m
SILVYN® EMC AS-CU							
64400500	10	7,0 x 10,0	28	12 x 1,5	10 x 1,0	7	50
64400501	14	10,0 x 14,0	34	16 x 1,5	12 x 1,5	9	50
64400502	17	13,0 x 17,0	40	20 x 1,5	16 x 1,5	11	50
64400503	19	15,0 x 19,0	45			13,5	50
64400504	21	17,0 x 21,0	50	25 x 1,5	20 x 1,5	16	50
64400505	27	22,0 x 27,0	63	32 x 1,5	25 x 1,5	21	50
64400506	36	29,0 x 36,0	85	40 x 1,5	32 x 1,5	29	25
64400507	45	38,0 x 45,0	100	50 x 1,5	40 x 1,5	36	25
64400508	56	49,0 x 56,0	135	63 x 1,5	50 x 1,5	48	25

Accessories

- 3M Scotch™ 1183 screening tape
- SILVYN® MSK-M US
- SILVYN® US-M
- SILVYN® US
- SILVYN® US-EDU-AS
- SILVYN® US-MS-DR

SILVYN® MSK-M BRUSH



Benefits

- Easy installation
- Faster, easier screen contact
- Optimum cable and conduit strain relief
- Maximum cable sealing
- Wide clamping range

Application range

- Mechanical engineering
- Plant engineering
- Heavy industry
- In EMC-sensitive environments

Product features

- Combination of SILVYN® and SKINTOP®

Note

- For suitable accessories, refer to SKINTOP® metric accessories

Pasujące peszle

- SILVYN® AS
- SILVYN® AS-P
- SILVYN® EDU-AS
- SILVYN® EMC AS-CU

Technical Data



ETIM 5.0 Class-ID: EC001180
 ETIM 5.0 Class-Description: Screw connection for protective metallic hose
 ETIM 5.0 Class-ID: EC001180
 ETIM 5.0 Class-Description: Screw connection for protective metallic hose



Material:
 Basis type:
 Body: nickel-plated brass
 Conduit connector seal: CR/NBR
 Tube seal: TPE
 EMC brush: brass



Protection rating:
 Cable: IP 68
 Conduit:
 IP 40 with SILVYN® AS, EDU-AS, EMC AS-CU
 IP 65 with SILVYN® AS-P



Temperature range:
 -30°C to +100°C



Info

- Conduit gland with the innovative BRUSH solution
- Optimum 360° screen contact



Article number	Metric size	Suitable for conduit Ø [mm]	Pieces / PU
SILVYN® MSK-M dla SILVYN® AS			
55506020	25 x 1,5	21	10
55506021	32 x 1,5	27	1
55506022	40 x 1,5	36	1
55506023	50 x 1,5	45	1
55506024	63 x 1,5	56	1
SILVYN®MSK-M dla SILVYN®AS-P / EDU-AS / EMC AS-CU			
55506025	25 x 1,5	21	10
55506026	32 x 1,5	27	1
55506027	40 x 1,5	36	1
55506028	50 x 1,5	45	1
55506029	63 x 1,5	56	1

Accessories

- SKINDICHT® SM-M
- SKINTOP® DIX-M
- SKINTOP® DIX-M AUTOMATION
- SKINTOP® DIX-DV

Copper braid

Application range

- EMC-compliant screening
- Can be used as earthing tape
- Automotive industry

Norm references / Approvals

- ISO-TS approved

Design

- Variable diameter by tightening the braid

Included

- Are delivered in 2 pieces with 50 m each

Suitable conduits

- SILVYN® EMC AS-CU

Technical Data

	ETIM 5.0 Class-ID: EC001182 ETIM 5.0 Class-Description: Braided hose
	General Minor differences are possible depending on the production batch
	Note Degree of coverage: 85 % at maximum opening
	Material: Tinned-copper
	Temperature range: -30°C to +105°C Max. temperature: +120°C (short-term)



Article number	Article designation	[mm ²]	Approx. Ø range in mm	Number of wires x Ø [mm]	Weight [kg]	m per PU
Copper braid						
61721370	CU 14	1,32	1 - 4	24 x 7 x 0,1	1,3	100
61721380	CU 410	4,14	4 - 10	24 x 22 x 0,1	4,14	100
61721390	CU 1020	8,29	10 - 20	48 x 22 x 0,1	7,8	100
61721395	CU 2050	18,1	20 - 50	48 x 12 x 0,2	18,3	100

3M Scotch™ 1183 screening tape



Benefits

- Electrically-conductive strip provides exceptional screening of electromagnetic fields
- Uniform foil composition and its good conductivity to the substrate ensures low contact resistance, which is crucial for the degree of screening
- Solderable and corrosion-resistant
- Acrylic adhesive that is resistant to solvents

Application range

- Electromagnetic field screening
- Electrostatic discharge

Product features

- Copper foil is plated with a thin layer of tin
- Tin-plating is compatible with a wide range of base materials such as aluminium, lead and tin alloys, and galvanised steels

Norm references / Approvals

- UL 510 approved
- UL File Number: E17385

Technical Data

	ETIM 5.0 Class-ID: EC000128 ETIM 5.0 Class-Description: Adhesive tape ETIM 6.0 Class-ID: EC000128 ETIM 6.0 Class-Description: Adhesive tape
	Caution Adhesion (stripping force): 3.8 N/10 mm Tear strength: 44 N/10 mm
	Note Contact resistance (in acc. with MIL-STD-202): 0.005 ohms
	Info Storage: good stability when stored in a cool and dry location (room temperature and approx. 50% relative humidity)
	Colour delivered Silver grey (RAL 7001)
	Material: Smooth tin-plated copper film as a lining with a conductive acrylic adhesive
	Temperature range: -10 °C to +80 °C



Article number	Article designation	Width [mm]	m per PU
3M Scotch™ 1183 screening tape			
61721420	3M Scotch 1183 / 9x16,5	9	16,5
61721421	3M Scotch 1183 / 12x16,5	12	16,5
61721422	3M Scotch 1183 / 19x16,5	19	16,5
61721423	3M Scotch 1183 / 25x16,5	25	16,5

Ground Straps / Flat Ground Straps

Application range

- Control cabinet manufacturing
- The protective earth safety measure is prescribed by standard
- Fixed and moving metal parts, such as doors in switch cabinet construction, must be earthed







Product features

- Fixed lengths for M6 and M8 screws

Product Make-up

- Ground straps:
 - Strands of bare copper wires
 - PVC-based core insulation
 - Assembled with ring cable lugs
- Pressure-welded flat ground straps:
 - Strand made of tinned-copper wires
 - Welded ends
- Flat ground straps with sleeves:
 - Strands made of tinned-copper wires
 - Assembled with pressed contact sleeves

Technical Data

	ETIM 5.0 Class-ID: EC000490 ETIM 5.0 Class-Description: Accessories for earthing and lightning ETIM 6.0 Class-ID: EC000490 ETIM 6.0 Class-Description: Accessories for earthing and lightning
	Core identification code: Assembled ground straps green/yellow
	Conductor stranding: Assembled ground straps IEC 60 228 Class 6 Assembled flat ground straps IEC 60 228 Class 6, tin-plated Extra-fine wire
	Minimum bending radius: Assembled ground straps 7 x outer diameter Assembled flat ground straps 5 x outer diameter
	Test voltage: Assembled ground straps 2500 V
	Temperature range: Assembled ground straps -30°C to +70°C Assembled flat ground straps -5°C to +70°C



Article number	Cross-section [mm ²]	Article designation	For	Length [mm]	Copper index kg/1.000pieces	PU
Ground straps						
4571120	4	Ground strap 1 x 4/M6/170 mm GN/YE	M6	170	6,5	25
4571121	16	Ground strap 1x16/M6/170mm GN/YE	M6	170	26,2	25
4571122	25	Ground strap 1x25/M6/170mm GN/YE	M6	170	40,8	25
4571123	4	Ground strap 1x4/M8/300mm GN/YE	M8	300	11,4	25
4571198	16	Ground strap 1x16/M6/500mm GN/YE	M6	500	76,8	25
4571124	16	Ground strap 1x16/M8/300mm GN/YE	M8	300	46,2	25
4571125	25	Ground strap 1x25/M8/300mm GN/YE	M8	300	72	25
Pressure-welded flat ground straps						
4571132	10	Flat ground strap/press. 1X10/M6/200mm	M6	200	18	25
4571133	16	Flat ground strap/press. 1x16/M8/200mm	M8	200	29	25
4571134	25	Flat ground strap/press. 1x25/M8/200mm	M8	200	45	25
4571135	10	Flat ground strap/press. 1x10/M6/300mm	M6	300	27	25
70399965	16	Flat ground strap/press. 1X16/M6/200mm	M6	200	30,72	25
70399966	16	Flat ground strap/press. 1X16/M6/300mm	M6	300	46,08	25
4571136	16	Flat ground strap/press. 1x16/M8/300mm	M8	300	43,5	25
4571137	25	Flat ground strap/press. 1x25/M8/300mm	M8	300	67,5	25
70399969	25	Flat ground strap/press. 1X25/M8/500mm	M8	500	120	25
Flat ground straps with terminals						
4571196	6	Flat ground strap/terminals 1x6/M6/200mm	M6	200	15	25
4571197	6	Flat ground strap/terminals 1x6/M6/300mm	M6	300	20	25
4571126	10	Flat ground strap/terminals 1x10/M6/200mm	M6	200	25	25
4571127	16	Flat ground strap/terminals 1x16/M8/200mm	M8	200	35	25
4571128	25	Flat ground strap/terminals 1x25/M8/200mm	M8	200	55	25
4571129	10	Flat ground strap/terminals 1x10/M6/300mm	M6	300	32	25
4571130	16	Flat ground strap/terminals 1x16/M8/300mm	M8	300	51	25
4571131	25	Flat ground strap/terminals 1x25/M8/300mm	M8	300	80	25

