MICRO-EPSILON

More Precision

colorSENSOR WLCS-M-41

- *The all-round talent for colour recognition*

- *4 colour memory „Teach-in"*

- *Fibre optic with focus lenses to 100mm*

- *Colour and intensity evaluation*

- *High colour resolution*

- *„Plug & Play" operating concept*

Features:

- Multi-Teach by buttons on the sensor
- Separation of sensor and sampling point (explosion-protected for hazardous areas)
- Switch Output, 4x potential-free
- Adaption of fibre optics for every application
- Working distance 2-100mm, depending on fibre optic and lens
- Protection class IP65
- Solid enclosure concept for rugged industrial applications
- Independent of distance due to colour and intensity evaluation (C and C+ I)
- Resolution
  Colour ≤ 12bit
  Intensity ≤ 12bit
- External teaching
- - Perceptive colour processing
- White light LED as light source
- RS232 interface
- 4 colour grouping can be saved
- Four-stage signal amplification
- Colour spaces: C, C+I

Advantages:

- Application-oriented teaching of tolerances through „multiple teaching" per channel
- Separate tolerance setting via potentiometer for each colour memory is also possible
- Genuine three sector device
- Fibre optic adaption
- Universal operation
- No selectivity gaps in the colour range

Application examples:

- Colour sorting and inspection
- Recognising similar colours
- Recording colour codes
- Recognising positions
- Recognising locking compounds
- All colour recognition tasks (between 390 and 750nm)
- Recognition of intensity

Dimensions:

Dimensions in mm, not to scale

106
40
87.5
71
63
4
4
Ø 4.2
Ø 4.2

① POWER
②
③

> max
in range
< min

OUT
TEACH
1 2 3 4

① El. connection M23
② Serial port (M9 3-pin)
③ FASOP optical adapter (FA) for fiber optic connection standard reflex type: see 1

Type	WLCS-M-41
Article number	10234062
Object distance	dependent on the fibre optics used and the optical heads reflex mode fibre optical cables typically 2mm-25mm with lens, typically 5mm-150mm [1]
Light spot diameter	dependent on the fibre optics used and the optical heads reflex mode fibre optical cables, typically Ø 0.6mm-30mm [1]
Colour difference	ΔE ≥1.5
Colour spaces	C, C+I
Averaging	more than 32 values
Size of the colour memory	max. 4 colours in non-volatile EEPROM with tolerance level via potentiometer
Switching frequency	1kHz, 32Hz with averaging
Reproducibility	in the C+I colour range ≤ 12 Bit-A/D conversion
Temperature drift X,Y	0.1% / K
Light source	white light LED, AC mode
Type of illumination	via fibre optic
Effect through illumination	suitable for flexibility
Ambient light	up to 5000Lux
Intermittent light operation	AC: typ. 20kHz
Power supply	+18 - 30VDC
Current consumption	typ. 240mA
Max. switching current	240mA
TEACH button/inputs	4 buttons and IN1 - IN4 for external teaching of the colour reference
Outputs	OUT 1-OUT 4, digital (0V/+Ub), short-circuit protected, 100mA max. switching current
Switching state display	visualisation by means of 4 yellow LEDs
Interface	RS232
Type of connector	to PLC: 19-pole flange socket (Harting) to PC: 3-pole flange socket
Connection cable	to power/PLC: art no. 11234089 / to PC: art. no. 11234090 (RS232)
Receiver	3-PIN photodiodes with colour filter
Software	-
Pulse extension	-
Signal amplification	-
Housing material	aluminium, black anodised
Operating temperature	0°C - +50°C
Storage temperature	0°C - +80°C
Protection class	IP65
Fibre optic	p. 34 onwards

[1] Type: FAR-T-A2.0-2,5-1200-67° reflex
 Type: FAD-T-A2.0-2,5-1200-67° transmitted light (p. 36 onwards)

- For colorSENSOR

- High-quality fibre optics with polished and ground end-faces

- Fibres for visible, ultraviolet and infrared light

- For wavelengths from 190 – 2500nm

Features:

- Temperature stability from –40°C to +400°C (special bonding)
- Various aperture angles available 68° (NA0.86), 22° (NA0.21), 121° (NA0.87)
- Maximum cable lengths of 30m available; default lengths: 600, 1200, 1800 or 2400mm
- Large selection of sensor mechanisms for different tasks

Standard versions

Micro-Epsilon fibre optics for colour sensors and fibre optic sensors for measurements and testing feature a high build and transmission quality.

Ground and polished end-faces ensure excellent optical integration with adapted sensors. A large selection of sensor mechanisms provides optimum flexibility for a great variety of tasks.

Special versions

Fibre optics with increased vibration protection

Fibre optics can be manufactured to include increased vibration protection for use with high mechanical loads, such as shock, acceleration, and movement. This special treatment minimises friction between fibres and reduces shocks.

Fibre optics with special bonding for high temperatures

Standard bonding is suitable for maximum temperatures of 80°C.
Special adhesives allow for temperatures of up to 250°C, even 400°C. These higher temperature ranges require the use of Type E stainless steel sheathing. Temperatures of up to 600°C can be reached with metallized fibres and with sapphire optics installed.

Customer-specific designs

One of the advantages of Micro-Epsilon fibre optic manufacturing is the production of customer-specific designs for various complex sensor mechanisms.

Technical data			
Single fibre diameter	20, 30, 50, 70µm standard fibre (depending on structure)		
Aperture angle	standard fibres	67° (NA 0.56)	
	special fibres	22° (NA 0.21) 121° (NA 0.87 / wide angle) 22° UV (80/100µm) 22° IR (80/100/150µm)	
Material	optical glass (e.g. for UV / IR / in quartz glass)		
Dielectric strength	50kV/m with PVC protective sheath		
Sensor mechanism – temperature range, fibre bonding	standard	-20°C to + 80°C	
	T250	0°C to + 250°C	
	T400	-40°C to + 400°C	
	T600	0°C to + 600°C	
Permissible temperature range with sheathing that has appropriate fibre bonding	PVC	-20°C to +80°C	(P) (Z)
	metal	+40°C to +180°C	(M)
	metal with special bonding	-40°C to +400°C	(E)
	metal/silicone	-40°C to +180°C	(T)
Fibre transmission	usable for wavelengths from 190-2500nm of different types (we can provide the most suitable solution depending on the requirements) Transmission curves on request!		

Order code for fibre optics

You can see an overview of the Fasop fibre optic range on the following pages.

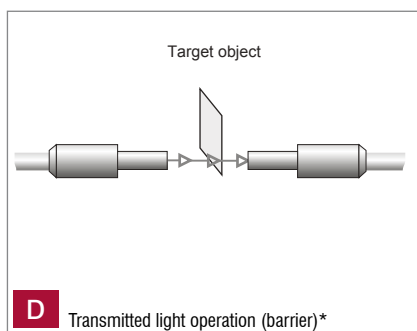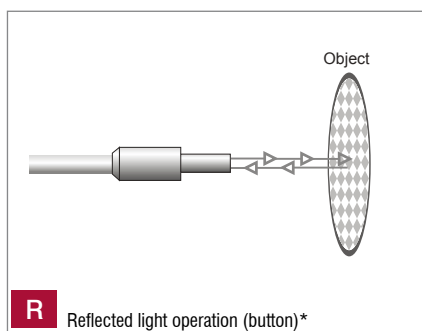You can define your own individual fibre optic from the various components using the order key.

Ordering code FA D — T — A 2.0 — 2.5 — 1200 — 67°
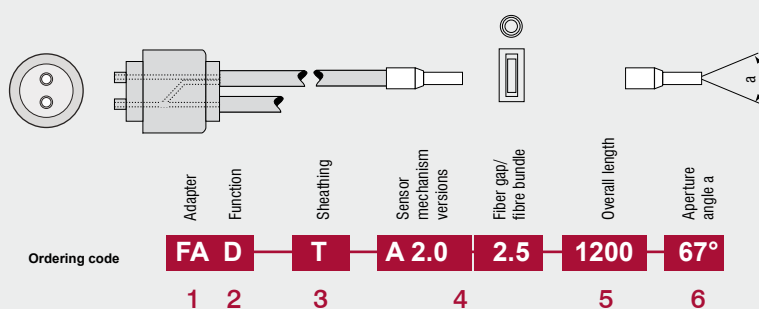
1 Adaption to FA-adapter

2 Function of the fibre optic (D = transmitted light mode, R = reflex mode)

3 Sheathing e.g. silicone-metal sheath (T)

4 Sensor mechanism type, e.g. A2.0
Fibre bundle e.g. 2.5mm dia.

5 Overall length of e.g. 1200mm (standard length / bearing types)

6 Aperture angle of the fibre, e.g. 67 °

1 Adapter version

34

8

Ø 3.8

Ø 15

15

Connecting nut
M18x1

Adapter, FA System FASOP

2 Functions

Object

R Reflected light operation (button)*

Target object

D Transmitted light operation (barrier)*

α

Object
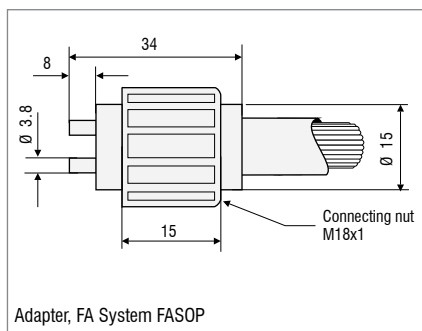
D Transmitted light operation (V arrangement) for reflective and shiny surfaces
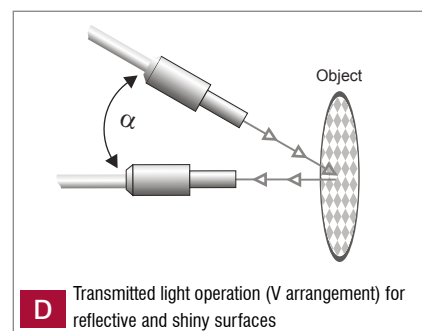
* All functions can also be performed as mutliple reflex and transmitted light functions

3 Sheathing

Silicone metal sheath
Metal wire-spiral-reinforced hose with glass fibre braiding and silicone rubber sheathing

T Very flexible, highly resistant to bending, tension and torsion; temperature-stable to 180°C, liquid-tight

Stainless-steel sheath
Flexible stainless steel wire-spiral-reinforced hose[1]

E Flexible, protection against mechanical stress, temperature-stable to 400°C

Metal sheath
Flexible brass wire-spiral-reinforced hose [1]

M Flexible, protection against mechanical stress, temperature-stable to 180°C

PVC-metal sheath
Flexible brass spiral-reinforced hose coated with PVC sheathing [1]
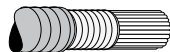
Z Flexible, protection against mechanical stress, temperature-stable to 80°C

PVC special sheath
Highly flexible plastic hose [2]

P Highly flexible, small sheath diameter, temperature-stable to 80°C

[1] Bending radius corrresponds to three times the external diameter of the sheath.
[2] Bending radius corrresponds to twice the external diameter of the sheath.

Details of sheath diameters can be found in Section 4:

Please note: Every version can be supplied with increased vibration protection (VS).
See the „Special versions" section for more information

4 Sensor mechanism variants and fibre bundles
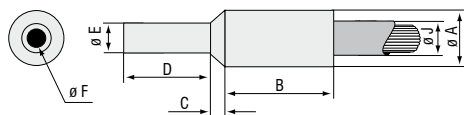
Type	A Ø	B	C	D	E Ø	F Ø	P	Ø J M	T
A 1.0	4.6	8	2	11	2.5	1.5	4	4	–
A 1.1	6.6	8	2	11	2.5	1.5	–	5	4.4
A 2.0	6.6	10	2	12	4.5	2.5	6	6	5.8
A 3.0	8.5	11	2	15	6	3	7	7	7.5

A Type A ferrule, stainless steel
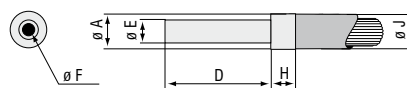
Type	A Ø	D	E Ø	F Ø	H	Ø J P	Ferrule
B 1.1	2	30	1	0.6	2	2	stainless steel
B 1.2	2	10	1	0.6	2	2	stainless steel
B 2.0	3	10	2	1	2	3	alu
B 3.0	5	12	4	2.5	2	5	alu
B 4.0	8	12	6	3	2	8	alu

B Type B ferrule
(only suitable for PVC sheathing)
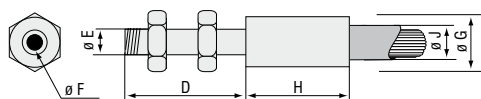
Type	D	E	F Ø	G Ø	H	P	Ø J M	T
C 1.0	30	M4	1.0	6	13	5	5	4.4
C 2.0	30	M6	2.5	8	15	6	6	5.8
C 3.0	30	M10	3	11	12	7	7	7.5

C Type C ferrule, stainless steel

Standard sensor mechanism, bonding
for -20°C to +80°C
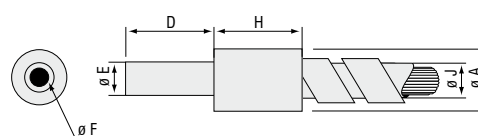Special designs available (T250, T400, T600)

All details in mm
Tolerances: typ. +/- 0.1mm
Al ferrule, black anodised

Different sizes are possible by arrangement,
please ask our product specialists.
(see also the „Special versions" section)
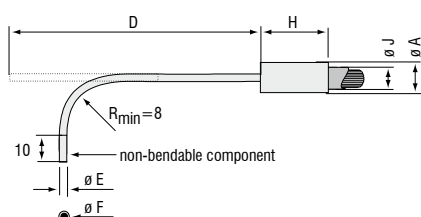
Type	A Ø	D	E Ø	F Ø	H .	P	Ø J M	T
O 1.0	2	100	1	0.6	10	2	–	–
O 1.1	7	100	1	0.6	20	–	5	4.4
O 2.0	3	100	1.3	1	10	3	–	–
O 2.1	7	100	1.3	1	20	–	5	4.4

O Type O ferrule, bendable, to an extent

Type	A Ø	D	E Ø	F Ø	H	Ø J M	T	Ferrule
M 1.1	6	30	1	0.6	10	5	4.4	stainless steel
M 1.2	6	10	1	0.6	10	5	4.4	stainless steel
M 2.0	6	10	2	1	10	5	4.4	alu
M 3.0	7	12	4	2.5	12	6	5.8	alu
M 4.0	9	12	6	3.5	12	7	7.5	alu
M 5.0	12	16	7	5	16	9	9	alu
M 6.0	13	16	8	6	18	10	11.5	alu
M 8.0	16	20	10	8	20	13	13.5	alu
M10.0	18	20	12	10	20	15	–	alu

M Type M ferrule

4 Sensor mechanism variants and fibre bundles
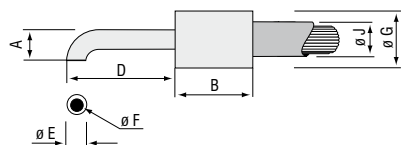
Type	A Ø	B	D	E Ø	F Ø	G Ø	r	P	Ø J M	T
D 1.0	2.5	10	20	1	0.6	3	1.5	2	–	–
D 1.1	2.5	13	20	1	0.6	6	1.5	–	–	4.4
D 2.0	6	13	20	2	1.5	6	4	5	5	4.4
D 3.0	15	17	20	5	2.5	9	10	7	7	6.5

D **Type D ferrule, stainless steel**
(* D1.0 only suitable for PVC sheathing)
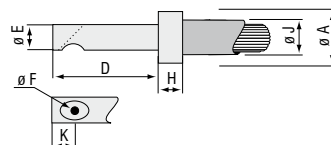
Type	A Ø	D	E Ø	F Ø	H	K	P	Ø J M	T
E 1.0	4	20	3	1.5	1.5	4	4	–	–
E 2.0	5	20	4	2.5	1.5	4	5	5	–
E 2.1	7	20	4	2.5	10	4	–	–	5.8
E 3.0	8	20	6	3	1.5	5	7	7	–

E **Type E ferrule, stainless steel**
(* E1.0 only suitable for PVC sheathing)
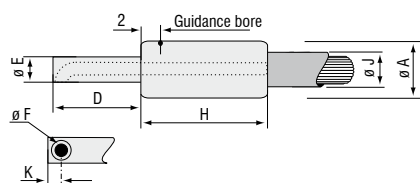
Type	A Ø	D	E Ø	F Ø	H	K	P	Ø J M	T
F 1.0	8	20	6	1.5	9	3	5	5	5.8
F 2.0	10	20	8	2.5	10	4	6	6	6.5
F 3.0	12	20	10	3	10	5	7	7	7.5

F **Type F ferrule, stainless steel**
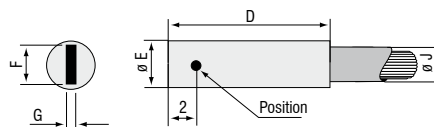
| Type	D	E Ø	F	G max.	P	Ø J M	T
R 1.0	25	4	3	0.5	3	–	–
R 1.1	30	7	3	0.5	6	6	5.8
R 2.0	25	7	6	1	6	6	5.8**
R 2.1	30	10	6	1	–	7	7.5

Type R ferrule, aluminium
R * R1.0 only suitable for PVC sheathing
** at 6x1 mm², can be made to a length of 1200
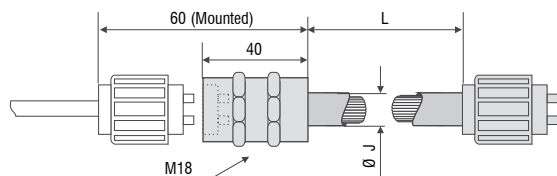
Fibre bundle Ø	P	Ø J M	T	L
(3mm)/ channel	12	13	13.5	variable

LV **Type LV ferrule**
Fibre optic extension / feed-through

All details in mm
Attention: With angular sensor mechanism versions, a reduction in range can be expected compared to axially emerging versions.
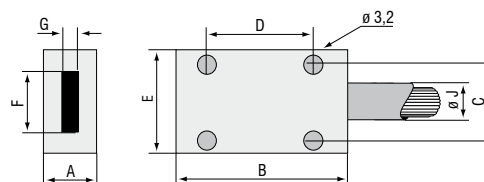
Type	A	B	C	D	E	F	G	Ø J
Q1	12	25	9	15	15	5	0.5	
Q2	12	30	14	20	20	10	0.3	
Q3	12	35	24	25	30	18	0.3	
Q4	12	55	34	40	40	28	0.2	
Q5	12	55	44	40	50	38	0.15	
Q6	12	55	54	40	60	48	0.15	
Q7	16	75	64	60	70	58	*	
Q8	16	75	74	60	80	68	*	
Q9	20	90	84	75	90	78	*	
Q10	20	90	94	75	100	88	*	

(F x G 3.5 mm² for CLS and IFA applications with FA adapter)

Q **Type Q, aluminium**
Also available in stainless steel

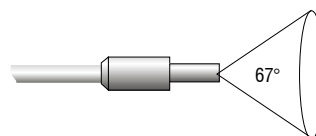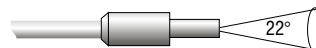## **5 + 6** Length and aperture angle

Standard lengths are: 600*, 1200*, 1800 and 2400mm.

* Bearing types

5 Length tolerance type: +/- 4%

Cable lengths of up to 30m can be supplied on request!

6 Dependent on the glass fibre material used the following aperture angles are included in the standard range: 22°, 67°, 121°

Detection areas, various sensor mechanisms

Fibre bundle ØF mm	Working distance mm	Light spot for 67° fibre approx. Ø mm	Light spot for 22° fibre approx. Ø mm
0.6	5	3	3
	10	5	4
	15	8[1]	6
	20	12[1]	8
1	5	3	3
	10	7	5
	15	11	8[1]
	20	15[1]	11[1]
1.5	5	4	3
	10	7	5
	15	11	8
	20	19[1]	11
2.5	5	5	4
	10	10	8
	15	13	10
	20	19[1]	13
3	5	8	5
	10	12	7
	15	15	10
	20	18[1]	13

Typical values were determined using colorSENSOR LT-2-ST

[1] Can be realised only in certain conditions

- Focussing of colour and fibre optic sensors

- Improving the efficiency of the application

- Many possible applications

Features:
- Working distances from 8mm to 200mm
- Scratch-resistant glass lens
- Robust aluminium housing
  (black anodised)
- Bundling to a small light spot
- Increasing the range
- Minimum colour change when the distance
  is altered
- High luminous efficiency
- Special designs possible, according to
  customer requirements
- Colour measurement on small objects at a
  relatively large distance (Kl-3, KL-4)
- Recognising highly absorbent objects
  (KL-5, KL-14, KL-17)

Type LWL FASOP	Article number	Object distance (typ.)	Detection range (typ.)*	Dimensions
KL-3-A2.0 [3]	10823012	8mm - 20mm	Ø 1mm - 5mm Ø 1mm at 10mm	L x Ø ap. 60mm x 15mm
KL-M18-A2.0 [1]	10823020	20mm - 50mm	Ø 3mm - 10mm Ø 3mm at 20mm	L x Ø ap. 51mm x M18 x 1
KL-M18-XL-A2.0 [1]	10824358	Pos1 50 - 120mm Pos2 10 - 180mm Pos3 10 - 160mm	Pos1 Ø 4-7mm Ø 4mm at 80mm Pos2 Ø 7-11mm Ø 7mm at 110mm Pos3 Ø 7-11mm Ø 7mm at 120mm	L x Ø ap. 90mm x M18x1 (L=50mm)
KL-M34-A2.0 [1]	10823278	100mm - 180mm	Ø 15mm - 18mm Ø 15mm at 100mm	L x Ø ap. 85mm x M34 x 1,5
KL-M34/62-A2.0 [1]	10824196	80mm - 200mm	Ø 3mm - 5mm Ø 3mm at 120mm	L x Ø ap. 170mm x 62mm
KL-4-A1.1 [1]	10823262	8mm - 20mm	Ø 0,6mm - 3mm Ø 0,6mm at 10mm	L x Ø ap. 60mm x 15mm
KL-M18-A1.1 [1]	10824140	10mm - 50mm	Ø 2mm - 7mm Ø 2mm at 10mm	L x Ø ap. 51mm x M18 x 1
KL-D-40-A2.0 [2]	10824143	15mm - 25mm	Ø 3mm - 6mm Ø 3mm at 15mm	L x B x H ap. 43.4 x 49.5 x 12mm
KL-D-28-A2.0 [2]	10824197	20mm - 30mm	Ø 5mm - 8mm Ø 5mm at 20mm	L x B x H ap. 31.7 x 40.5 x 15mm
KL-D-20-A2.0 [2]	10823021	10mm - 50mm	Ø 4mm - 10mm Ø 4mm at 10mm	L x B x H ap. 21.4 x 33 x 12mm
KL-D-17-A2.0 [2]	10823220	30mm - 80mm	Ø 8mm - 25mm Ø 8mm at 30mm	L x B x H ap. 36.5 x 25.5 x 15mm
KL-D-14-A2.0 [2]	10823022	60mm - 120mm	Ø 10mm - 20mm Ø 10mm at 60mm	L x B x H ap. 37 x 50 x 20mm
KL-D-6-A2.0 [2]	10823409	100mm - 200mm	Ø 15mm - 30mm Ø 15mm at 100mm	L x B x H ap. 31.1 x 45.1 x 20mm
KL-5-R1.1 [1]	10824198	8mm - 20mm	Ø 2mm x 0,3mm to 15mm x 3mm 2x0.3mm at 10mm	L x Ø ap. 60mm x 15mm
KL-8-R2.1 [1]	10823920	8mm - 20mm	Ø 4mm x 0,7mm to 30mm x 5mm 4x0.7mm at 10mm	L x Ø ap. 60mm x 15mm

* The smallest figure in the table relates to the smallest typical optical diameter that is generated.
  This corresponds to roughly the smallest detection area for colour or fibre optic sensors.
[1] Reflex fibre optic (FAR)
[2] Transmitted light mode fibre optic cables (FAD)
[3] Can be realised in conjunction with FAR-X-A2.0-0.6-XXXX-67° reflex mode fibre optical cable (FAR) measurement spot of approx. 0.2mm

colorSENSOR accessories

Art. no.	description	suitable for:
11234089	CAB-M23-19P-co-fm-straight; 2m-PUR; open ends	colorSENSOR WLCS M-41 (power and PLC)
11234097	CAB-M23-19P-co-fm-straight; 5m-PUR; open ends	colorSENSOR WLCS M-41 (power and PLC)
11234090	CAB-M9-3P-co-straight; 2m-PUR; RS232	colorSENSOR WLCS M-41 (RS232)
11234098	CAB-M9-3P-co-straight; 5m-PUR; RS232	colorSENSOR WLCS M-41 (RS232)
11234091	CAB-M9-8P-co-straight; 2m-PUR; open ends	colorSENSOR LT and OT series (power and PLC)
11234099	CAB-M9-8P-co-straight; 5m-PUR; open ends	colorSENSOR LT and OT series (power and PLC)
11234092	CAB-M9-5P-co-straight; 2m-PUR; RS232	colorSENSOR OT-3-XX-200 (RS232)
11234100	CAB-M9-5P-co-straight; 5m-PUR; RS232	colorSENSOR OT-3-XX-200 (RS232)
11234093	CAB-M9-4P-co-straight; 2m-PVC; RS232	colorSENSOR LT-1-ST; LT-2-XX (RS232)
11234101	CAB-M9-4P-co-straight; 5m-PVC; RS232	colorSENSOR LT-1-ST; LT-2-XX (RS232)
11234094	CAB-M9-4P-co-straight; 2m-PVC; USB	colorSENSOR LT-2-XX (USB)
11234102	CAB-M9-4P-co-straight; 5m-PVC; USB	colorSENSOR LT-2-XX (USB)
11234095	CAB-M5-4P-co-straight; 2m-PUR; RS232	colorSENSOR LT-1-LC-20; LT-3; OT-3 series (RS232)
11234103	CAB-M5-4P-co-straight; 5m-PUR; RS232	colorSENSOR LT-1-LC-20; LT-3; OT-3 series (RS232)
11234096	CAB-M5-4P--co-straight; 2m-PVC; USB	incl. RS232 to USB adapter suitable for: colorSENSOR LT-1-LC-20; LT-3; OT-3 series (USB)
11234104	CAB-M5-4P-co-straight; 5m-PVC; USB	incl. RS232 to USB adapter suitable for: colorSENSOR LT-1-LC-20; LT-3; OT-3 series (USB)
11234368	CAB-M5-4P-co-straight; 2m-PVC; RJ45-co-fm-Eth	incl. RS232 to Ethernet adapter suitable for: colorSensor LT-1-LC-20; LT-3; OT-3 series (Ethernet)
11234274	reflectance standard 1.25" Fluorilon	colorSENSOR and colorCONTROL
11233482	white reference modul	colorSENSOR LT-2-DU
2420065	PS2030 power supply 24V/24W/ 1A; 2m-PVC; terminal-2P-co-fm-straight	Power supply of all sensors with 24 V DC

colorCONTROL MFA accessories

| Art. no.	description	suitable for:
10814105	POF-2.2mm plastic fibre optic cable	colorCONTROL MFA
11251112	thread fitting; LWL; M4	POF-2.2
11251113	lens optic 6mm	thread fitting; LWL; M4
11253931	thread fitting; 3mm lens; LWL; M4	POF-2.2
11254108	thread fitting; 90° optics; LWL; M5	POF-2.2
11253959	reducer sleeve 2.2/1mm POF; 2 pcs.	colorCONTROL MFA for use of POF-1mm
10813842	POF-1mm fibre optic cable	colorCONTROL MFA in connection with the reducer sleeve 2.2/1mm POF
11253906	guide sleeve 1mm	POF-1mm
10824431	guide sleeve 1 mm x 50 mm	POF-1mm
11234305	CAB-M8-4P-co-fm-straight; 2m-PUR; open ends	colorCONTROL MFA-1 (power and PLC)
11234306	CAB-M8-4P-co-fm-straight; 5m-PUR; open ends	colorCONTROL MFA-1 (power and PLC)
11294205	CAB-M9-2P-co-fm-straight; 2m-PUR; open ends	colorCONTROL MFA-5 (power)
11294206	CAB-M9-2P-co-fm-straight; 5m-PUR; open ends	colorCONTROL MFA-5 (power)
11234094	CAB-M9-4P-co-straight; 2m-PVC; USB	colorCONTROL MFA-5 (USB)
11234102	CAB-M9-4P-co-straight; 5m-PVC; USB	colorCONTROL MFA-5 (USB)
11234095	CAB-M5-4P-co-straight; 2m-PUR; RS232	colorCONTROL MFA-5 (RS232)
11234103	CAB-M5-4P-co-straight; 5m-PUR; RS232	colorCONTROL MFA-5 (RS232)
11294243	assembly kit MFA-10	colorCONTROL MFA-5 + MFA-5-M
11294244	assembly kit MFA-15	colorCONTROL MFA-5 + 2 x MFA-5-M
11294245	assembly kit MFA-20	colorCONTROL MFA-5 + 3 x MFA-5-M
11294203	CAB-socket board-6P-co-fm-straight; 2m-PVC; 2P-open ends	colorCONTROL MFA-5-P (power)
11294054	CAB-socket board-6P-co-fm-straight; 1m-PVC; USB	colorCONTROL MFA-5-P (USB and power)
11294204	CAB-socket board-4P-co-fm-straight; 2.5m-PVC; RS232	colorCONTROL MFA-5-P (RS232)

Pin assignment

CAB-M23-19P-co-fm-straight; Xm-PUR; open ends
(Art. no.: 11234089; 11234097)
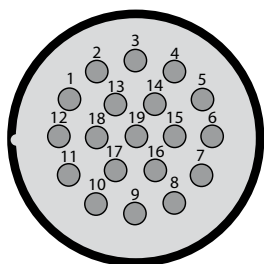
Pin	Colour	WLCS-M-41
1	green	IN TF
2	grey	OUT Int. OK
3	pink	n.c.
4	red	OUT 4
5	white	OUT 2
6	blue	GND (0V)
7	violet	n.c.
8	grey/pink	n.c.
9	red/blue	IN HOLD
10	white/green	IN 1
11	brown/green	IN 2
12	yellow	PE
13	white/yellow	Common
14	-	-
15	black	OUT 1
16	yellow/brown	OUT 3
17	white/grey	IN 3
18	grey/brown	IN 4
19	brown	+24V DC (±10%)

CAB-M9-8P-co-straight; Xm-PUR; open ends
(Art. no.: 11234091; 11234098)
Connection cable to power/PLC or digital I/O
(max. length. 10m, sheath PUR)
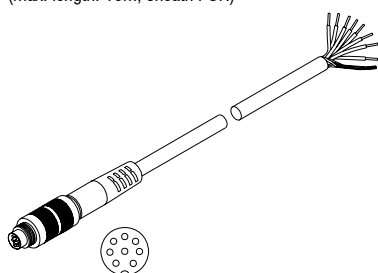
Pin	Colour	LT-1- LC-10 / ST	SB1 LT-2- ST/DU	SB2 LT-2- ST/DU	LT-1-LC-20 LT-3-XX/OT-3-XX
1	white	OUT 0	OUT 0 / OUT A 0	OUT 1	GND (0V)
2	brown	OUT 1	OUT 1 / OUT A 1	OUT 2	+24V DC (±10%)
3	green	IN 1	IN 1	OUT 3	IN 0
4	yellow	IN 0	IN 0	OUT 4	OUT 0
5	grey	n.c. / OUT 4	CLK (OUT K)	OUT 5	OUT 1
6	pink	OUT 3	OUT 2 / OUT A 2	OUT 6	OUT 2
7	blue	GND (0V)	GND (0V)	OUT 7	OUT 3
8	red	+24V DC (±10%)	+24V DC (±10%)	OUT 0	OUT 4

CAB-M8-4P-co-fm-straight; Xm-PUR; open ends
(Art. no.: 11234305; 11234306)
Connection cable to to power/PLC
(max. length 5m, sheath PUR)
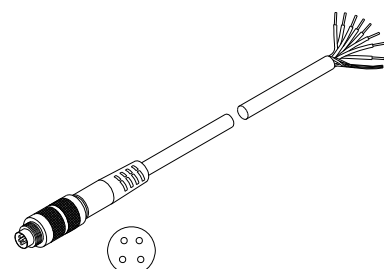
Pin	Colour	MFA-1
1	brown	+ 24V DC
2	white	Extern Teach
3	blue	GND
4	black	NPN/PNP

CAB-M9-2P-co-fm-straight; Xm-PUR; open ends
(Art. no.: 11294205; 11294206)
Connection cable to power
(max. length. 10m, sheath PUR)
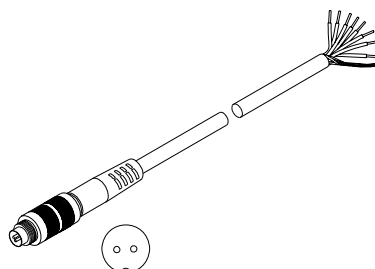
Pin	Colour	MFA-5
1	white	+24V DC
2	brown	GND

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