



## Model number

FC-21-V



## Features

- Electronic cam-operated switch
- LED indicator, red
- Adding or subtracting
- Up to 24 outputs
- Storage of up to 10 programs
- 24 tracks with a max. of 512 cams
- Shock resistance in accordance with DIN EN 60068-2-27
- Vibration resistance in accordance with DIN EN 60068-2-6
- Manual inclusive
- Absolute value encoder can be connected (incl. connector plug MR-16L)
- FC-21D external indicator unit can be connected

## Technical data

### General specifications

Data storage	EEPROM
Programming	keypad-driven menu

### Indicators/operating means

Type	7-segment LED display, red
Number of decades	4
Display value	digit height 8 mm
Display interval	0 ... 9999
Resolution	360, 512, 720 or 1024 position can be set
Switching state	via 24 LEDs

### Electrical specifications

Operating voltage	93 ... 126 V AC / 195 ... 264 V AC, 50 ... 60 Hz (and external 24 V DC supply required for the outputs)
Power consumption $P_0$	30 VA

### Input

Type	absolute encoder via Gray Code (10 bit) number of cam tracks: 24 number of cams: 512
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### Output

Sensor supply	for absolute encoders
Optocoupler	max. 30 V and 30 mA every output
Measuring error	
Switch points, number	max. (resolution/2) per output

### Ambient conditions

Ambient temperature	0 ... 50 °C (273 ... 323 K)
Storage temperature	-20 ... 70 °C (253 ... 343 K)
Relative humidity	45 ... 90 % (non condensing)

### Mechanical specifications

Connection	plug-in screw terminals, max. core cross-section 0.34 ... 1.5 mm <sup>2</sup>
Mass	2000 g
Dimensions	210 mm x 162 mm x 58 mm

## Function

The function of the FC-21-V Electronic Cam Switch Unit corresponds to that of a mechanical cam switch unit. The current position of the machine that is to be controlled is read in by an absolute value rotary encoder.

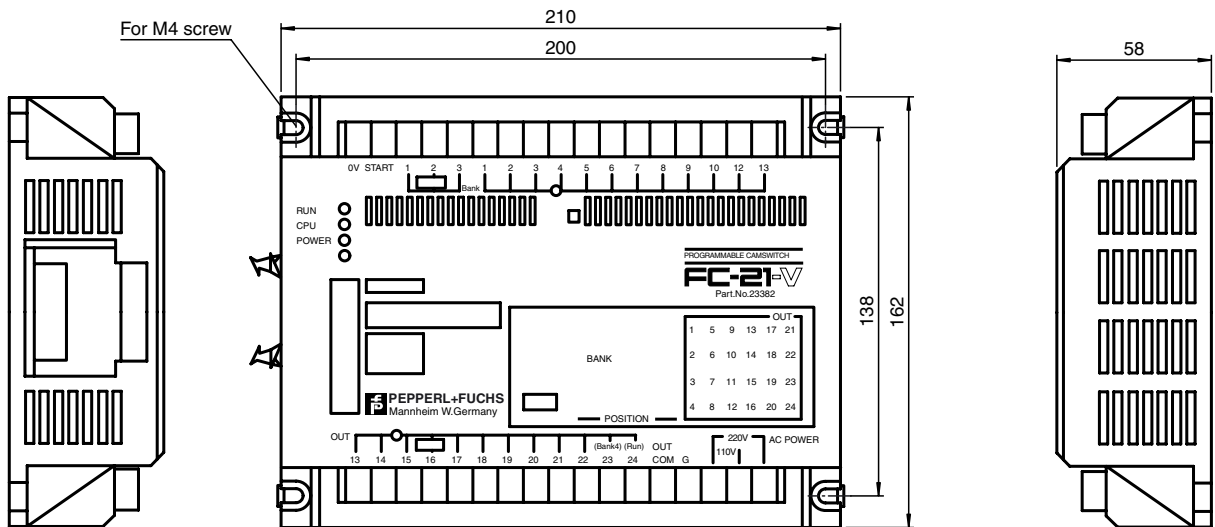
Depending on the resolution of the encoder, up to 512 cams can be programmed on each of the 24 cam tracks. The cams switch the electronic outputs on and off as a function of the read in position. The outputs of the FC-21-V are used to initiate the actuating elements of the machine (Solenoid valves, relays, etc.) in accordance with the operating cycle and they also provide the link to higher level control systems (PLCs, etc.).

The FC-21-V electronic cam switch unit satisfies the requirements of flexible manufacturing systems in that up to 10 different programs can be stored in the user memory (EEPROM) and selected externally.

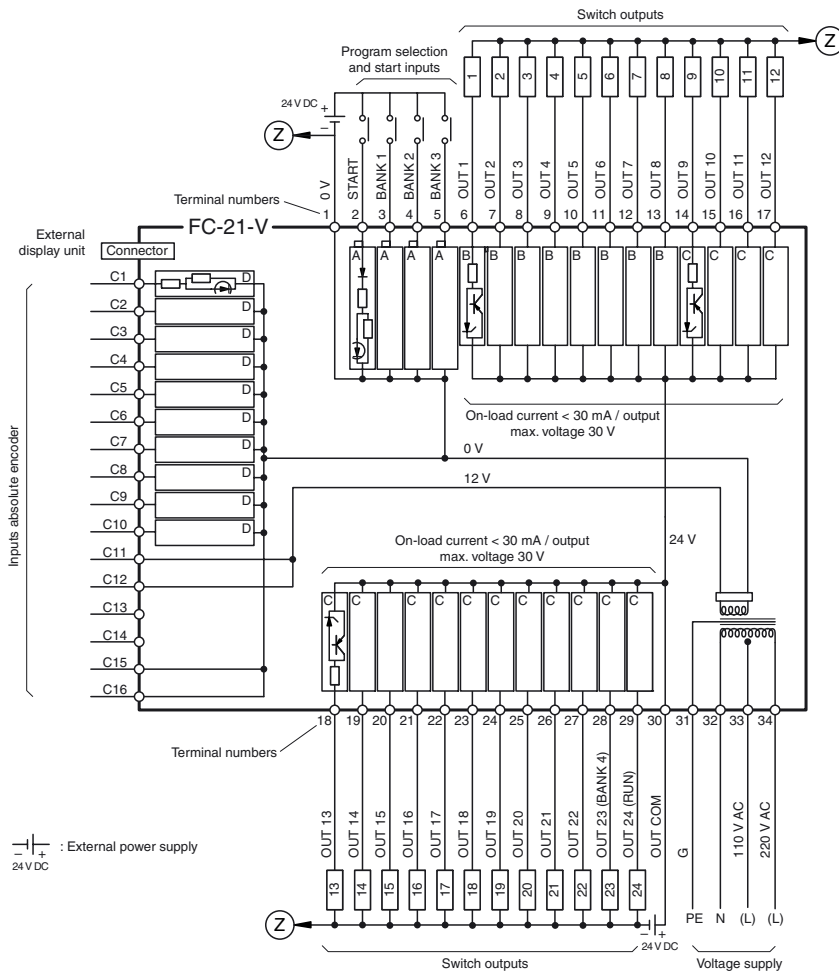
For the purpose of data security the programs can be stored on normal commercially available cassettes using a cassette recorder.

The FC-21-V electronic cam switch unit operates with the absolute value encoders in the TRD-AK...-GC-Series, which can code 360, 512, 720 or 1024 positions per revolution. The operating cycle of the machine that is to be controlled can be resolved into 1°, 0.7°, 0.5° or 0.35° intervals.

Indicating / Operating means / Dimensions



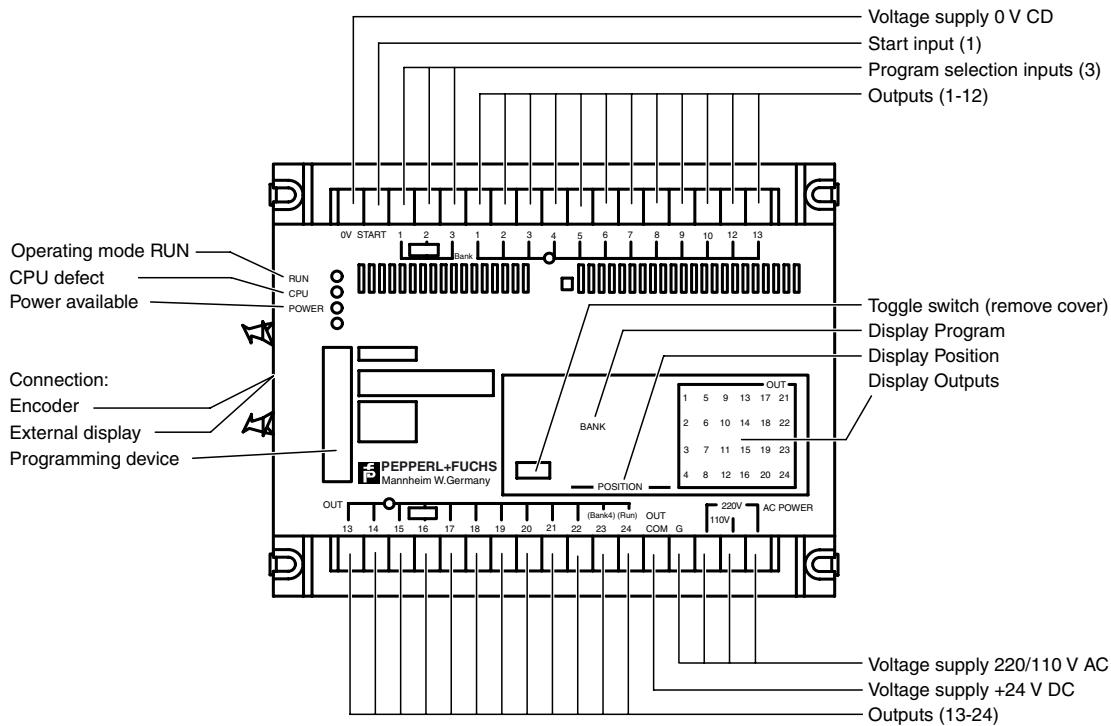
Electrical connection



Notes

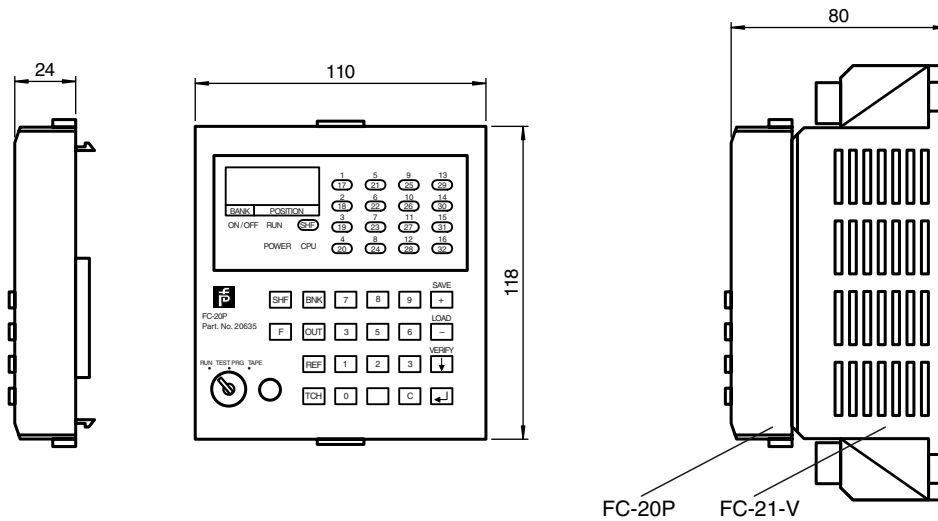
Maximum rpm	Min. switch point separation	Resolution per revolution				
		360	512	720	1024	
	> 3° of the interval	3600	2520	1800	1260	
	> 2° of the interval	2400	1680	1200	840	
Maximum possible programs	Number of programs	Resolution	Number of outputs			
		10	360	16		
		7	360	24		
		7	512	16		
		4	512	24		
		5	720	16		
		3	720	24		
3	1024	16				
2	1024	24				
Switching direction (clockwise/anti-clockwise)	Clockwise: Increase of the instantaneous value by rotation of the shaft clockwise, as viewed on the top of the shaft. Anti-clockwise: Increase of the instantaneous value by rotation of the shaft anti-clockwise, as viewed on the top of the shaft. (adjustable via toggle switch 1)					
Write protection	ON: writing, correction and deletion of programs is blocked (adjustable via toggle switch 6)					
Correction of the reference point	Correction over the whole operating distance: 0 ... (resolution - 1)					

Controls and indicators



Accessories

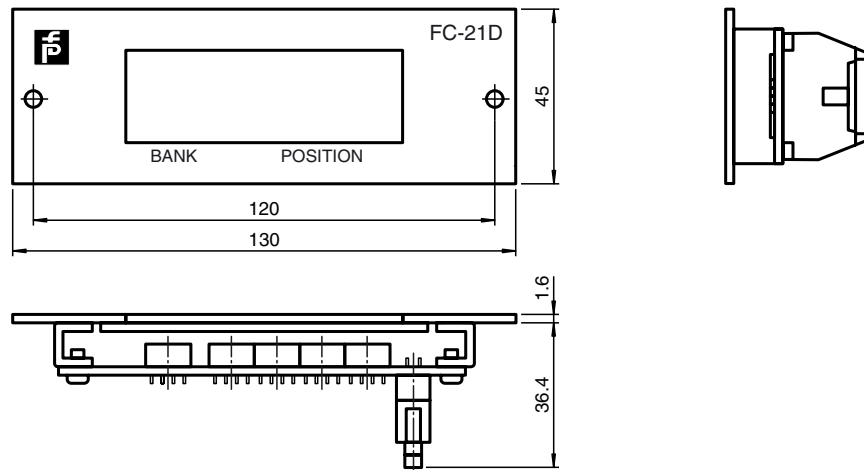
Programming Unit FC-20P



to be ordered separately

Accessory (delivery package): Cable connector for cassette recorder C-08J, 2 keys for program selector switch

External indicator unit FC-21D



to be ordered separately

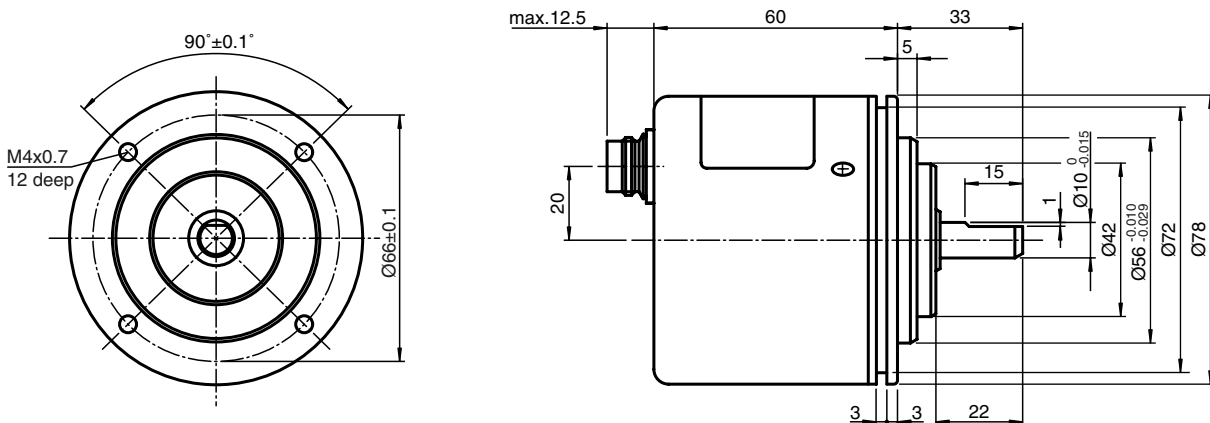
Technical data	
<b>General specifications</b>	
Function	Indicator for program, position or rotational speed (min <sup>-1</sup> )
<b>Indicator</b>	
Type	LED red
Digit height	14,2 mm
<b>Ambient conditions</b>	
Ambient temperature	0 ... 50 °C
Storage temperature	-10 ... 70 °C
Relative air humidity	45 ... 85 % (non-condensing)
<b>Mechanical data</b>	
Shock resistance	10 G in 3 axis directions
Vibration resistance	A = 0,3 mm, f <sub>max</sub> = 10 ... 55 Hz in 3 axis directions
Weight	200 g

**Cassette recorder connection**

A normal commercial cassette data recorder for PC with controllable recording level can be used. Radio recorders are usually unsuitable, since the recording level is not compatible.

Technical data	
Recording connection	Microphone input
Play-back connection	Ear phone > 300 mW an 4 ... 16 Ω
Frequency range	300 ... 4000 Hz ± 6 dB
Transfer rate	830 Baud
Modulation method	FSK "1": 2 kHz, FSK "0": 1 kHz
Head marker/end marker	2 kHz
File numbers	0 ... 999

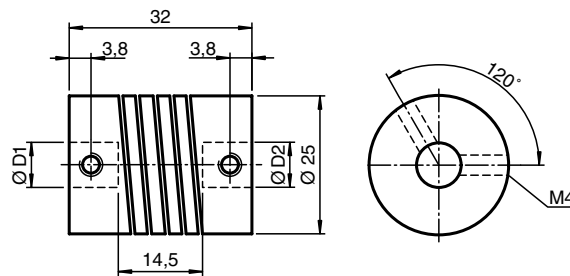
**Absolute value rotary encoder**



For further information see catalogue Sensors 4

Technical data	TRD-AK360-GC	TRD-AK512-GC	TRD-AK720-GC	TRD-AK1024-GC
Resolution	360 positions per revolution	512 positions per revolution	720 positions per revolution	1024 positions per revolution

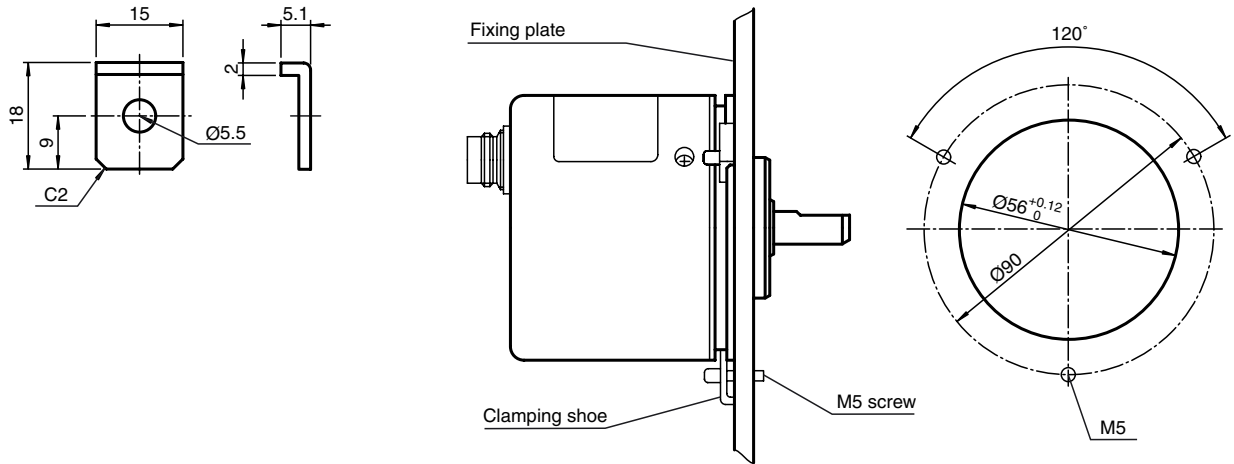
**Coupling KW-.../...**



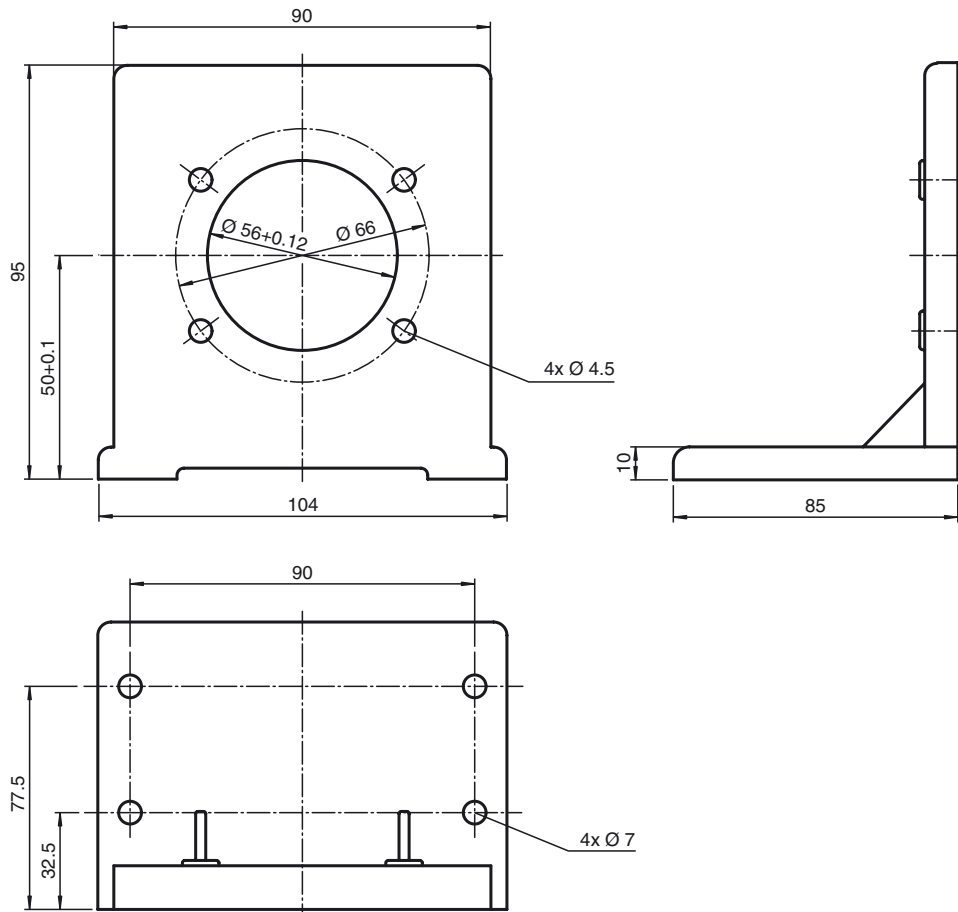
For further information see catalogue Sensors 4

Technical data	KW-6/10	KW-8/10	KW-10/10
Diameter D1	6	8	10
Diameter D2	10	10	10

Clamping shoe KM-9 - installation example



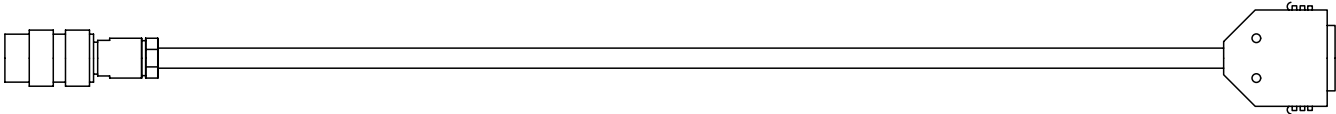
Right angled mounting bracket RT-11



Cable connector absolute value rotary encoder

TRD-AK..

FC-21-V



Binder-series 723, 12-pin connector (straight or angled), 12-core cable + screen, maximum length 30 m, cross section 0.25 mm<sup>2</sup>.

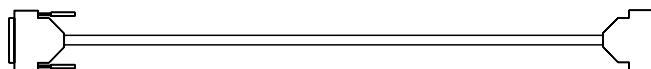
Connection	Function	Core colours
A	+12 V DC	red
B	2 <sup>0</sup>	brown
C	2 <sup>1</sup>	orange
D	2 <sup>2</sup>	yellow
E	2 <sup>3</sup>	green
F	2 <sup>4</sup>	dark blue
G	2 <sup>5</sup>	violet
H	2 <sup>6</sup>	gray
J	2 <sup>7</sup>	white
K	2 <sup>8</sup>	pink
L	2 <sup>9</sup>	light blue
M	0 V DC	black

screen not connected.

The binder connector and the cable must be ordered separately. The MRL-16L connector is supplied (separately) as an accessory for the FC-21-V. 5 m or 10 m pre-assembled connection cables are available on request.

Connection	Function	Core colours
1	2 <sup>5</sup>	violet
2	2 <sup>4</sup>	dark blue
3	2 <sup>3</sup>	green
4	2 <sup>2</sup>	yellow
5	2 <sup>1</sup>	orange
6	2 <sup>0</sup>	brown
7	2 <sup>9</sup>	light blue
8	2 <sup>8</sup>	pink
9	2 <sup>7</sup>	white
10	2 <sup>6</sup>	gray
11	free	–
12	+12 V DC	red
13	free	–
14	free	–
15	0 V DC	black
16	screen	–

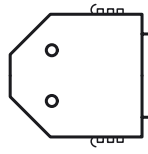
Cable connector E-15J for programming unit FC-20P



Length 1.5 m

For servicing work on awkwardly installed units, we recommend the use of this connection cable. The programming unit can then be operated from a more convenient position.

## Connector MR-16L



Connector for connection cable between FC-21-V main unit and absolute value rotary encoder