- Conntrol cables
- Mechanical transmitter
- Electronical transmitter
- Complete control assembly
- Oil dipstick systems
- Drive cables – automotive

meflex, Am Bahnhof 14, 35630 Ehringshausen www.meflex.de , info@meflex.de

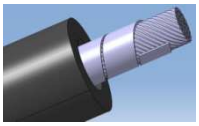
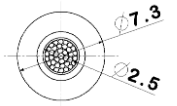
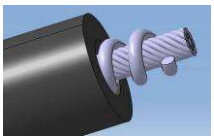
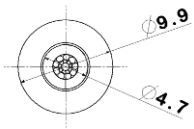
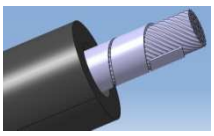
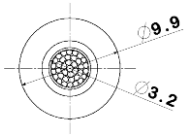
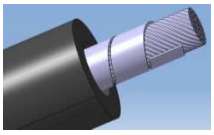
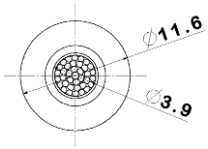
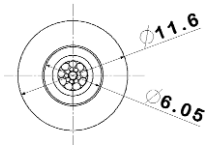
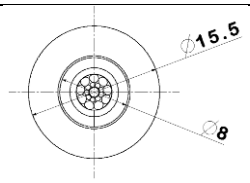
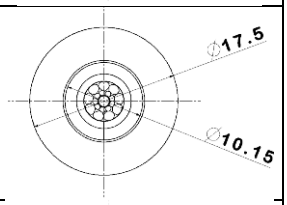
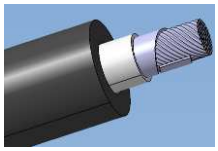
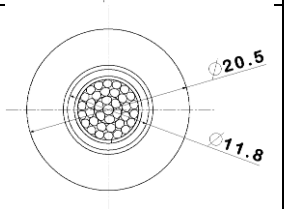
Directory

General information

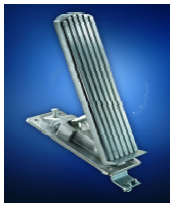
Characteristics of meflex products

- Stability under push or pull load
- Flexibility and three-dimensional routing
- Remarkable efficiency
- Maintenance-free service
- Very long service-life
- Temperature, corrosion, weather and mechanical influence resistance
- Handy control lever devices
- Individual adaptability
- Environment conscious production

Summary of types

Cable	Cable type	Conduit type	cable-/conduit image	
Push-pull cable	KL E613-114-001	K E637-131-310		
Pitch cable	A E614-103-001	A E637-103-310		
Push-pull cable	AL E613-109-001	AL E637-134-310		
Push-pull cable	BL E613-110-001	BL E637-132-310		
Pitch cable	BK E614-126-001	B E637-104-319		
Pitch cable	CK E614-110-001	C E637-105-319		
Pitch cable	DK E614-131-001	D E637-106-310		
Push-pull cable	E E613-108-001	E E638-103-430		

Summary of mechanical control levers

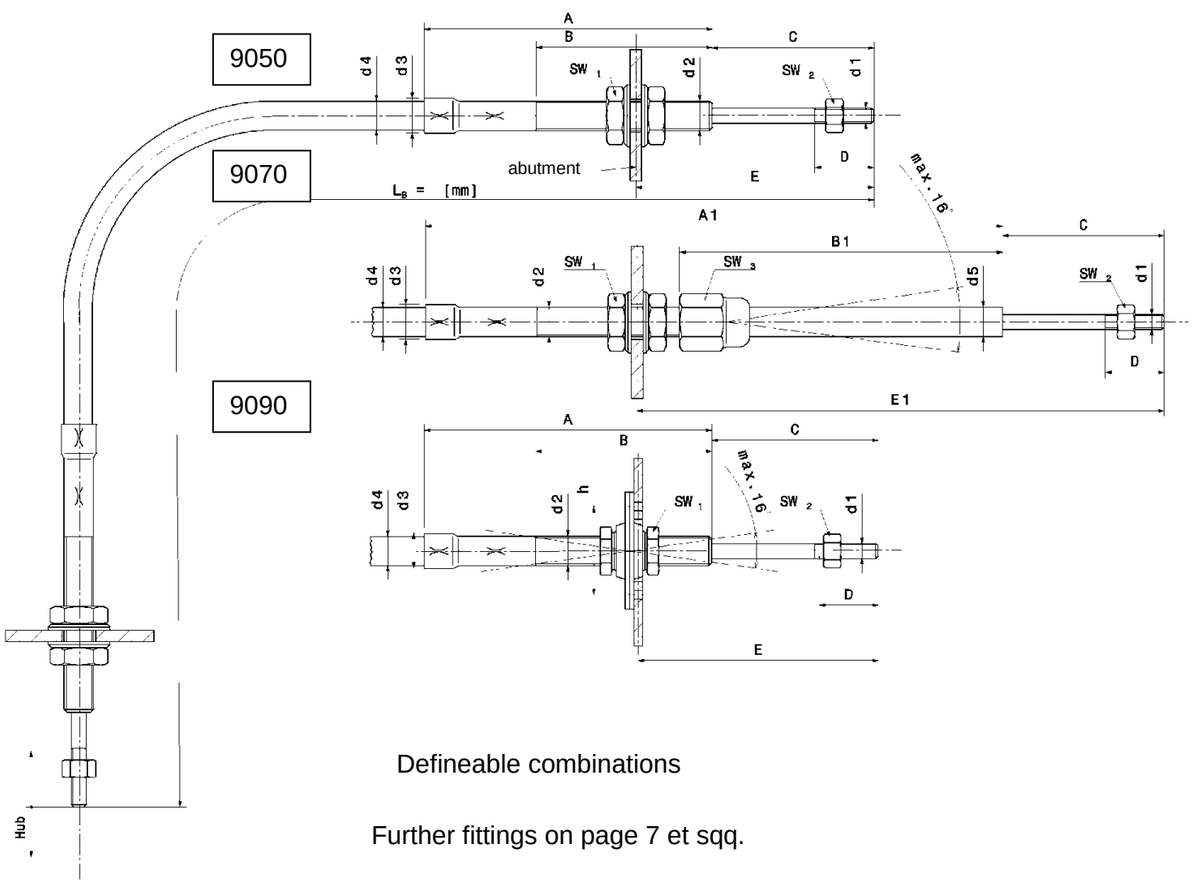
Control lever	Meflex-No.	image
Z28-Control lever	9203	
Z40-Control lever	9202	
US5-Control lever	9150	
Control lever 3	9170	
Control lever 4	9175	
ZK-Control lever	9236	
EZ-/ DZ-Control lever	9231 / 9232	
Pedal	9240	

Detailed information : page 12ff.

Summary of electronical control levers

Control lever	Meflex-No.	image
Z40e-control lever	9202	
ZKe-control lever	9236	
HG4e-control lever	9175	
Mechatronic control lever	9400	
Electronic Joystick	9410	

Push-Pull cables



Defineable combinations

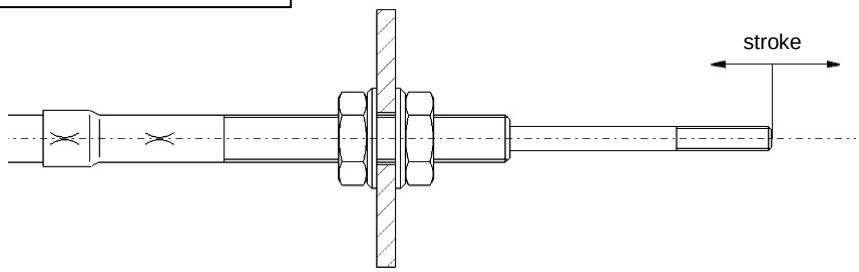
Further fittings on page 7 et sqq.

Technical data

				9050 / 9070 / 9090													9050 / 9090					9070				
Type	Cable	Temperature stability From -°C	Temperature stability To +°C	d1	d2	d3	d4	d6	D	Rmin	SW1	SW2	SW3	Operating load max. (N) Pull	Operating load max. (N) Push	travel	C	A	B	E	A1	B1	E1	d5	SW4
KL	Push-pull cable	40	120	M5	M12x1	15	9,8	4,7	20	80	19	13	8	250	120	40	55	108	60	85	211	115	192	11	19
																60	65	128	80	105	231	135	222		
																90	80	158	110	135	261	165	267		
																120	95	188	140	165	291	195	312		
																150	110	218	170	195	321	225	357		
																180	125	248	200	225	351	255	402		
																210	140	278	230	255	381	285	447		
A	Pitch-cable	40	120	M5	M12x1	15	9,8	4,7	20	80	19	13	8	700	350	40	55	108	60	85	211	115	192	11	19
																60	65	128	80	105	231	135	222		
																90	80	158	110	135	261	165	267		
																120	95	188	140	165	291	195	312		
																150	110	218	170	195	321	225	357		
															240	180	125	248	200	225	351	255	402		
																210	140	278	230	255	381	285	447		
AL	Push-pull cable	40	120	M5	M10x1	11,8	9,8	3,2	20	80	17	11	8	700	200	40	55	138	100	85	201	115	192	10	17
																60	65	158	120	105	221	135	222		
																90	80	188	150	135	251	165	267		
BL	Pitch-cable	40	120	M6	M12x1	14	11,6	3,9	20	100	19	13	10	1300	450	40	55	138	100	85	201	115	192	10	17
																60	65	158	120	105	221	135	222		
																90	80	188	150	135	251	165	267		
BK	Pitch-cable	40	120	M6	M12x1	15	11,6	6,05	20	100	19	13	10	1300	600	40	55	108	60	85	211	115	192	11	19
																60	65	128	80	105	231	135	222		
																90	80	158	110	135	261	165	267		
																120	95	188	140	165	291	195	312		
																150	110	218	170	195	321	225	357		
															400	180	125	248	200	225	351	255	402		
																210	140	278	230	255	381	285	447		
CK	Pitch-cable	40	120	M8	M16x1	20	15,5	7,85	30	150	24	19	13	2000	1100	40	65	112	60	95	215	115	202	14	22
																60	75	132	80	115	235	135	232		
																90	90	162	110	145	265	165	277		
																120	105	192	140	175	295	195	322		
																150	120	222	170	205	325	225	367		
															900	180	135	252	200	235	355	255	412		
																210	150	282	230	265	385	285	457		
DK	Pitch-cable	40	120	M10	M16x1	23	17,5	10	35	200	24	22	17	5000	3500	40	70	123	60	100	241	130	207	16	24
																60	80	143	80	120	261	150	237		
																90	95	173	110	150	291	180	282		
																120	110	203	140	180	321	210	327		
																150	125	233	170	210	351	240	362		
															2700	180	140	263	200	240	381	270	417		
																210	155	293	230	270	411	300	462		
E	Push-pull cable	30	90	M12x1,5	M18x1	26	20,5	12	35	280	27	24	19	11000	4700	40	70	123	60	100	241	130	207	19	27
																60	80	143	80	120	261	150	237		
																90	95	173	110	150	291	180	282		
																120	110	203	140	180	321	210	327		
																150	125	233	170	210	351	240	362		
															3800	180	140	263	200	240	381	270	417		
																210	155	293	230	270	411	300	462		

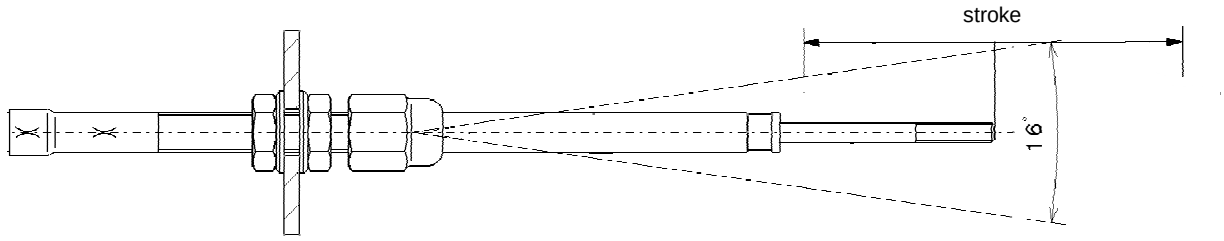
Instruction for installation

Standard push-pull cable 9050



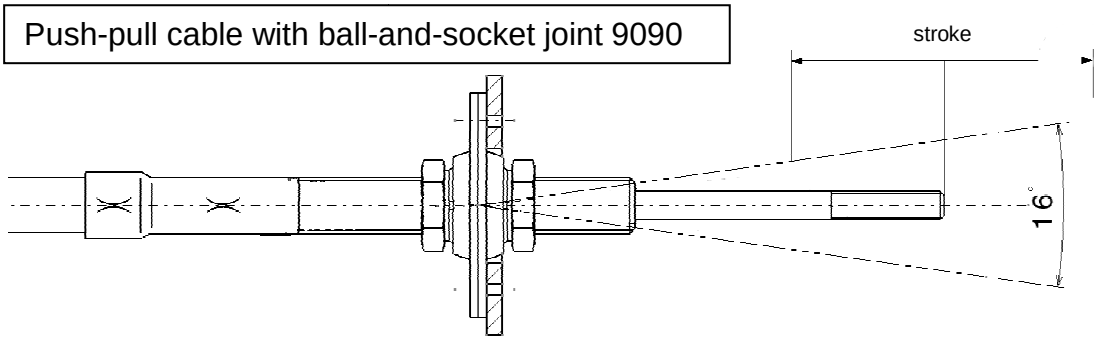
When motion is **pivoting,** the push-pull cable has to be installed in such a way, that the pivoting angle is similar to both sides.

Push-pull cable with rubber articulation 9070



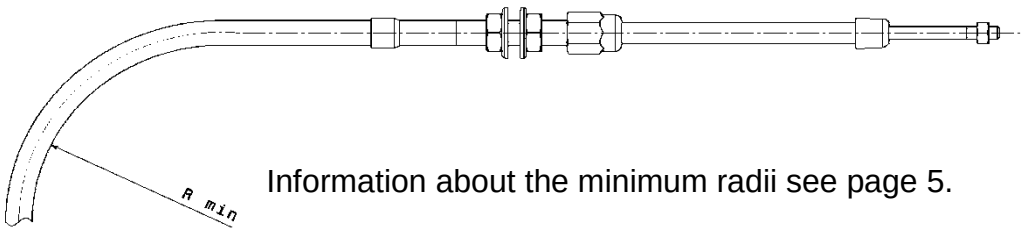
The max. angle of swiveling in total is 16° symmetric to the axle

Push-pull cable with ball-and-socket joint 9090



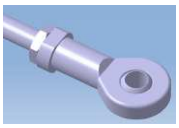
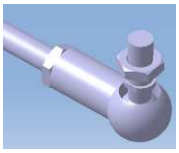
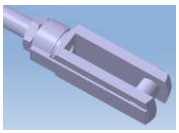
Laying radii

The larger the laying radius, the better the efficiency is. The specified minimum laying radii (R min.) have to be considered .



Information about the minimum radii see page 5.

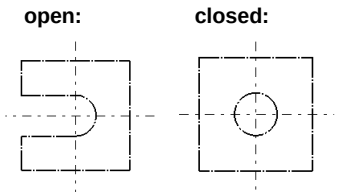
Options of connection

cable / bolt	
with joint head	
with angle joint	
with fork head and ES-bolt	

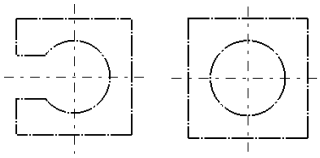
Conduit

Mounting options
for 9050 und 9070

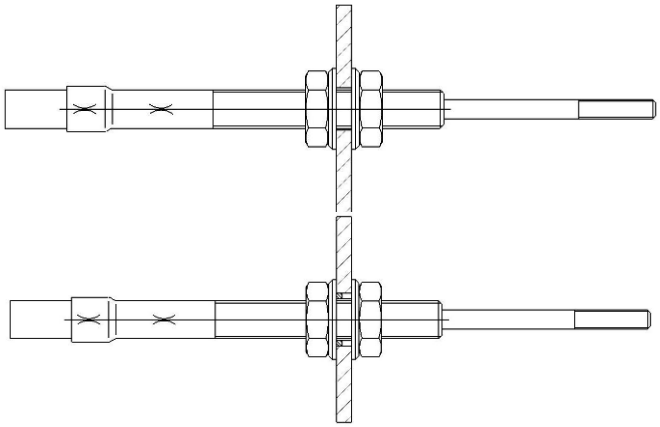
Abutment with disc



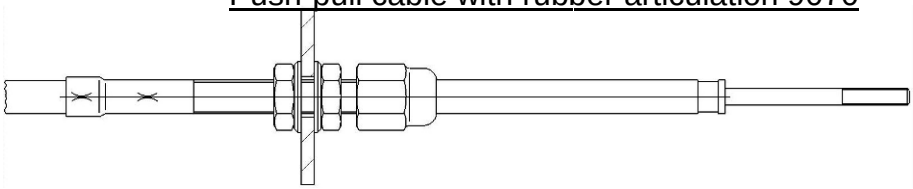
Abutment with centering disc and disc



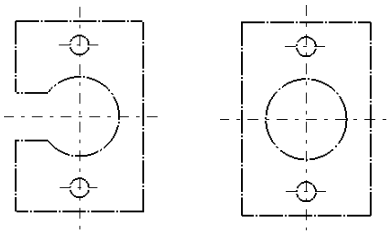
Standard push-pull cable 9050



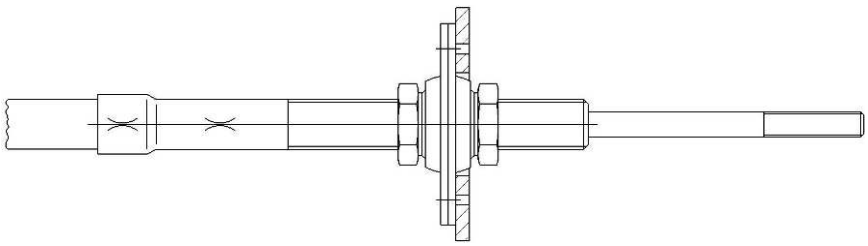
Push-pull cable with rubber articulation 9070



Abutment



Push-pull cable with ball-and-socket joint 9090



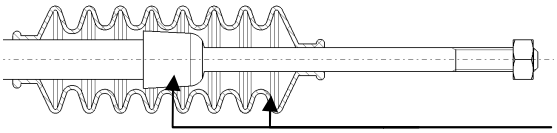
Options of sealing

The right and proper seal is very important for the function and service durability of push-pull cables. The choice of seal has to be made according to the environmental conditions as dirt, moisture, aggressive media etc., as well as a smooth running of the push-pull cable.

Seals and O-ring seals made of high-quality flexible and abrasion-proof materials able to strip dirt and moisture. The seal friction has of course an influence of the efficiency of push-pull cable.

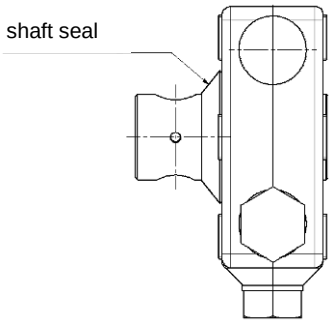
Bellows are covering the entire travel of push-pull cable and have got nearly no influence on the cable efficiency.

At extreme environmental conditions, **double sealing** (combination of grommet and bellow) increase the lifetime of push-pull cables substantially.



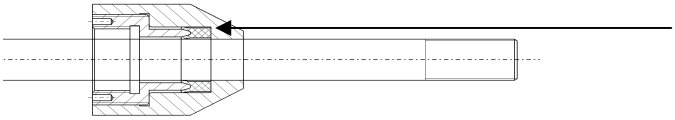
double sealing

Control levers with sealed housings are proven designs o keep away dirt, moisture and other influences.



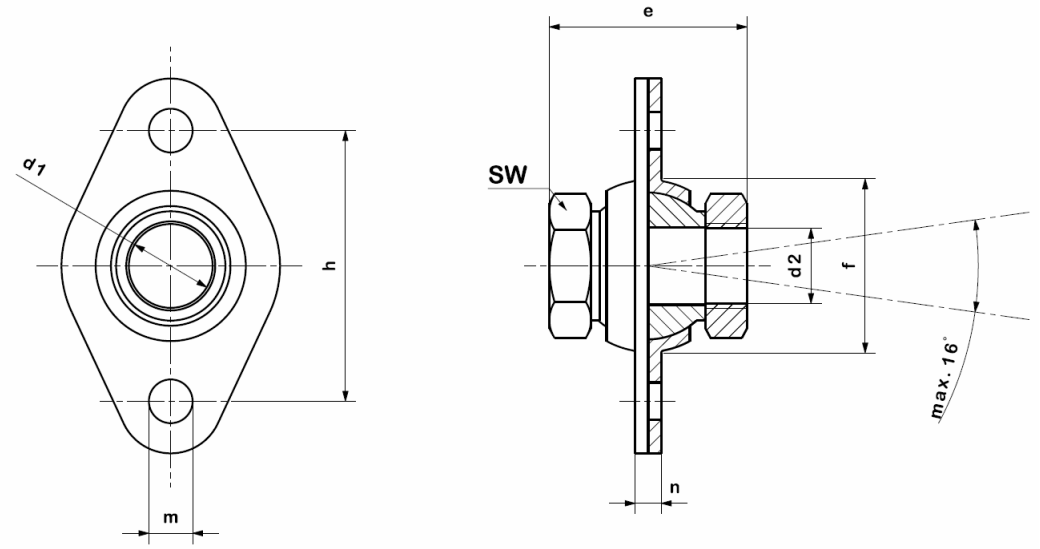
e.g. sealing of the lever
by shaft seal

At extreme weather conditions **sealing nuts** are used to seal the bolt, together with a grooved ring packing they seal the nut inside.



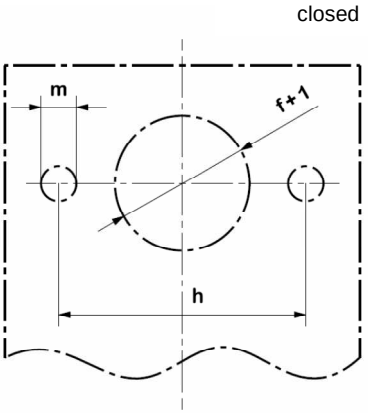
Sealing by a grooved ring packing

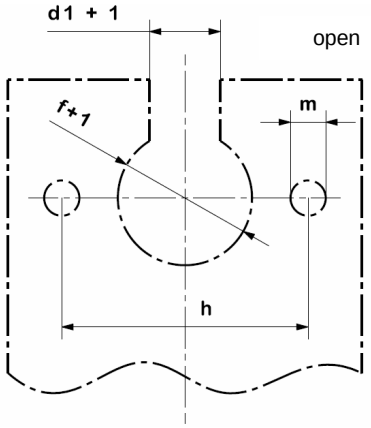
Instruction for installation of push-pull cable with ball-and-socket-joint



Cable type	size	material	d1	e	f	h	m	n	d2	SW
AL, A	KG10	brass	10,1	20	19	30	5,3	3	M10x1	14
	KG10-2	steel								
BL, BK	KG10-12/2	steel	12,1	24	21	30	5,3	3	M12x1	17
	KG12	brass	12,1	26	24	40	6,4	4		
CK, DK	KG16	brass	16,1	38	33	52	8,4	5	M16x1	24
E (special design)		brass	Data on request							

Examples of abutment types:



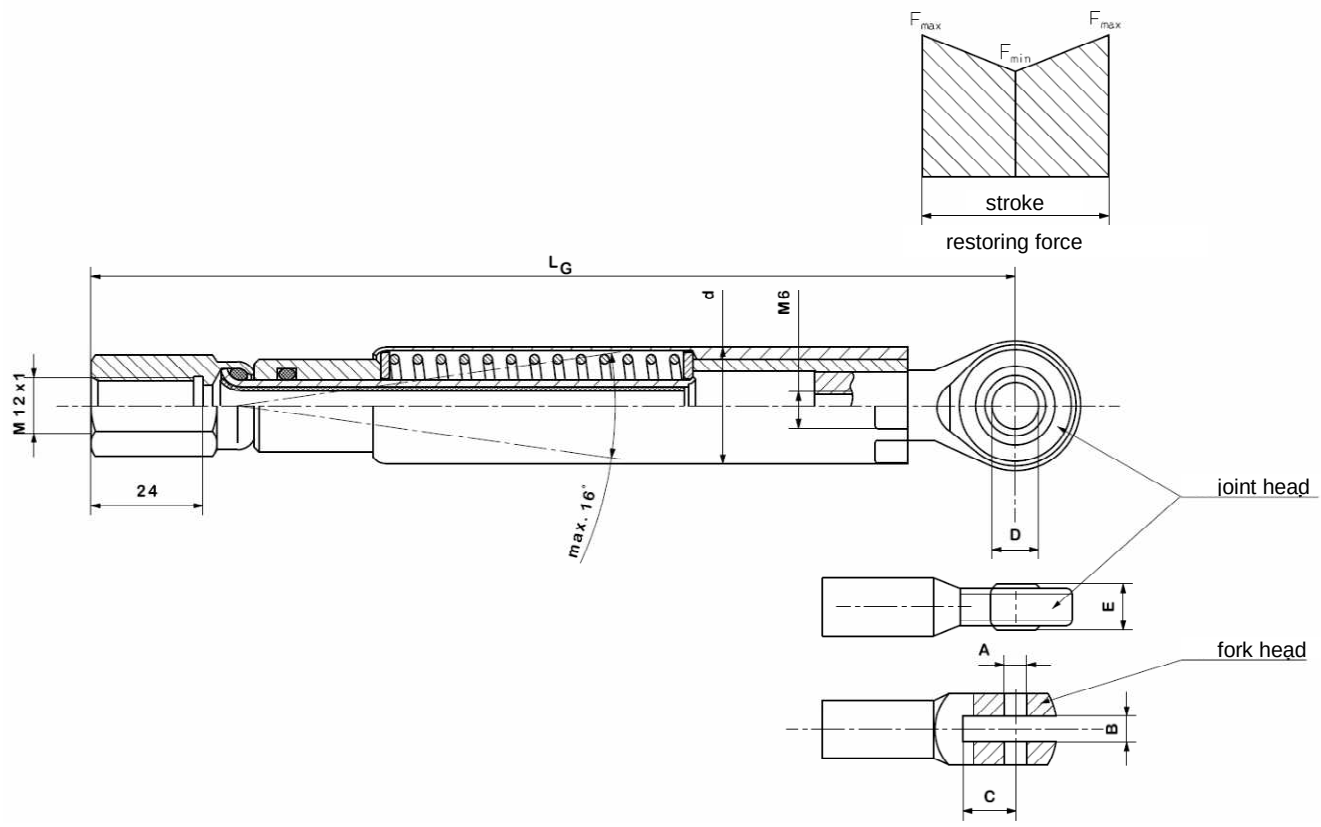


Spring return

The double-sided spring return fulfills two important functions.

1. Returning the push-pull cable into neutral position. The cable will be retracted into zero-position in pull and push direction as soon as the side of lever is released.
2. Fixing the neutral position. The existing clearance of the cable can not be observed.

The selection of the spring return hast o be specified by the necessary restoring force, the required travel and the options of connections.



Part-number	stroke max [mm]	F min / F max [N]	for type	thread	A	B	C	D	E	d	LG
E40112	40	226-305	A+B	M6				10	14	25	198
E32369	40	147-220	A+B	M6				8	12	25	195
E32065	50	75-140	A+B	M6				8	12	17	180
E04301	50	75-140	A+B	M6	6	6	24				180
E32069	64	58-140	A+B	M6	6	6	24				200

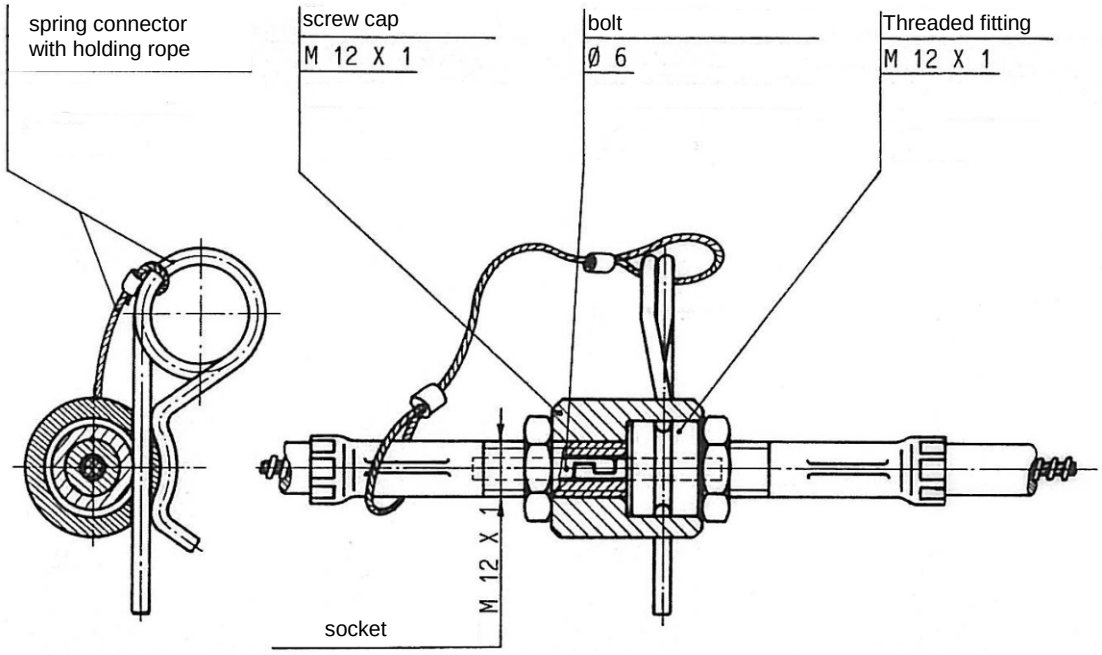
Push-pull cables type A (differing to type B) must be fitted with socket M12x1 and bolt M6 .

Quick release coupling

Quick release couplings make it possible to connect and disconnect push-pull cables with tractors, trailers or other devices.

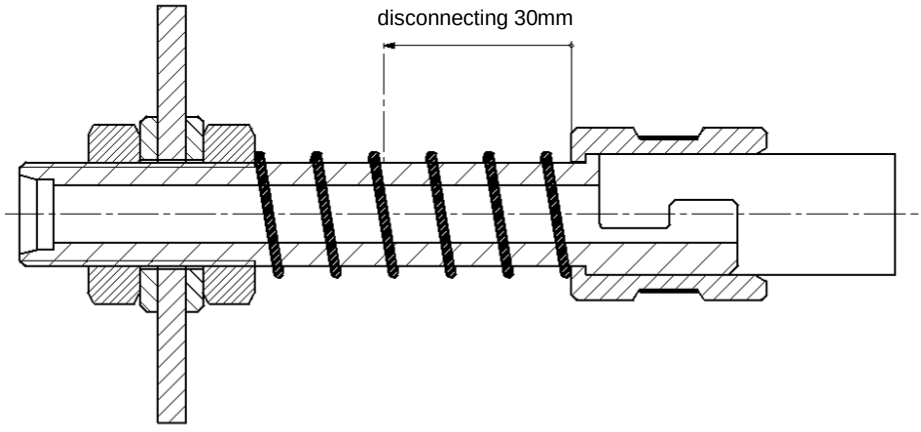
Quick release coupling with spring connector

After pulling out of spring connector both ends of conduit can be separated. The disconnection is only possible in a pre-assigned position. The hook-shaped cable end can now be disconnected as well as connected. This design is appropriate for all travel ranges.



Quick release coupling with lockbush

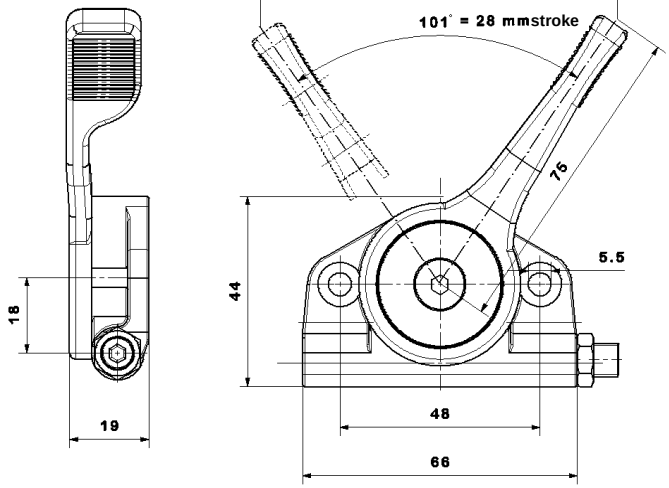
After moving the lockbush against a spring load, the hook-shaped conduit and cable ends can be disconnected and connected if the push-pull cable is in zero-position. The disconnection is only possible in a pre-assigned position. The lenght of the coupling has to be determined according to the requested travel



Mechanical levers

Z28 - lever

The meflex Z28 control lever is based on the gear wheel/ gear rod principle which is perfect for using as a gas control lever in extremely claimed smaller machines (such as tampers or vibratory plates) because of its compact and robust construction. It is stain-resistant because of its sealed construction.



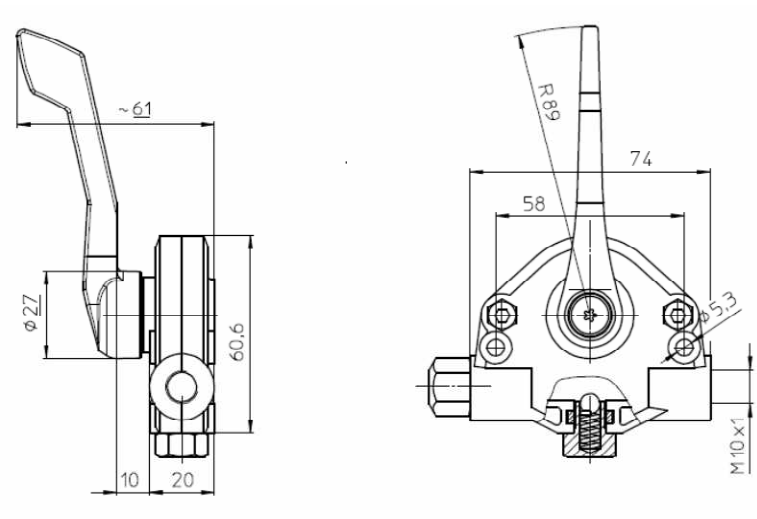
Mechanical Data	
Max. pivoting angle	101°
Ratio	1° = 0,28 mm
Max.stroke	28 mm
Cable types	type K and Bowden cable
Maintenance-free	
Fixing	2x screws M5

Operation limits and verifications	
Density	splash-proof
Maximum load	pull 100 N, push 100 N

Options
Self-locking
Ball notches

Z40 – lever

The meflex Z40 control lever is a gear rod lever which reaches a proportionally stroke with its compact construction. Like the Z28 control lever it is suitable e.g. for highly stressed smaller machines. This lever is available with a plastic molded handle (cf. page 20).



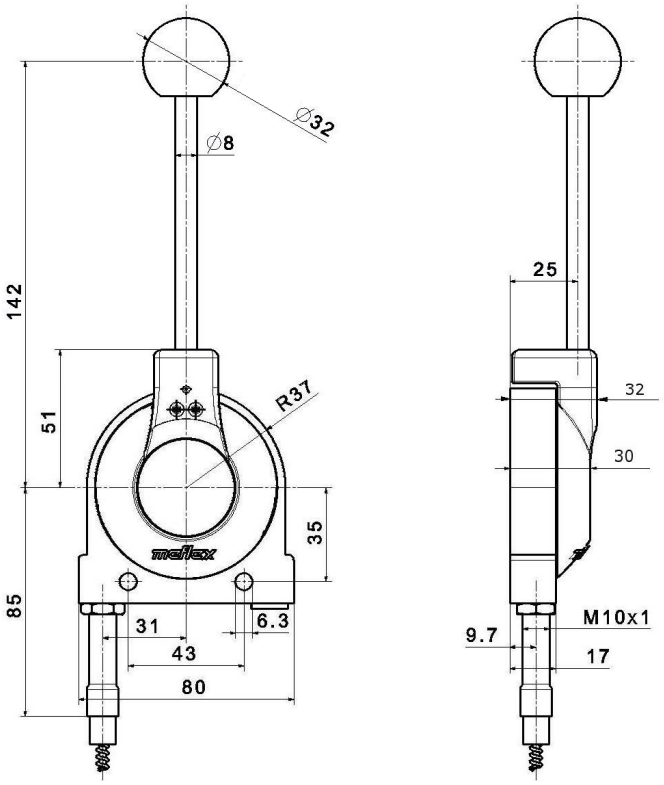
Mechanical Data	
Max. pivoting angle	115°
Ratio	1° = 0,348 mm
Max. stroke	40 mm
Cable types	type A, K and Bowden cable
Maintenance-free	
Fixing	2x screw M5

Operation limits and verifications	
Density	splash-proof
Maximum load	pull 200 N push 200 N

Options
Self-locking
Ball notches
Plastic molded handle

US5 – control lever

The meflex US5 lever is based on the chain-drive principle and, with its robust design and numerous optional features, is ideal for use in construction and agricultural machinery. Various optional features, such as e.g. positive notches and adjustable self-lockings, it can be tailored to perfectly meet the demands of a wide variety of uses.



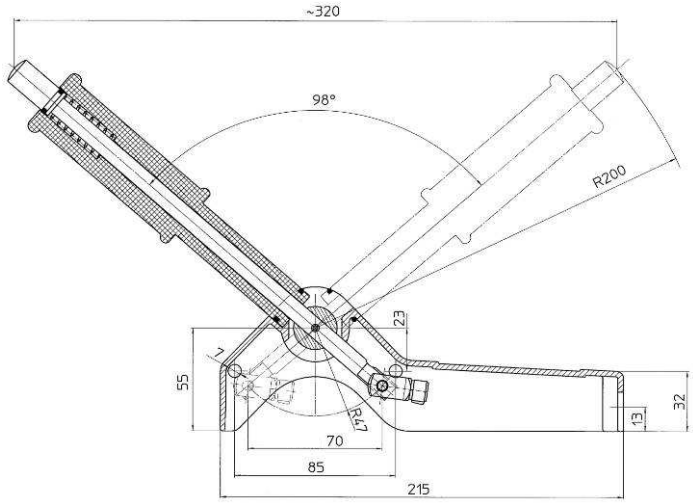
Mechanical Data	
Max. pivoting angle	170°
Ratio	1° = 0,54 mm
Max. stroke	90 mm
Cable types	type A and K
Maintenance-free	
Fixing	2x screw M6

Operation limits and verifications	
Density	splash-proof
Maximum load	pull 700 N, push 350 N

Options
Adjustable self-locking
Ball notches
Positive notches
Spring return

Control lever 3

The meflex lever HG3 is qualified as a mechanical remote control for all automatic coupling devices in agricultural and forest machinery as well as truck and trailers. Easy and safe coupling is guaranteed by his form-locking notch. It has no resistance to the reset force of the control by his free-movement.



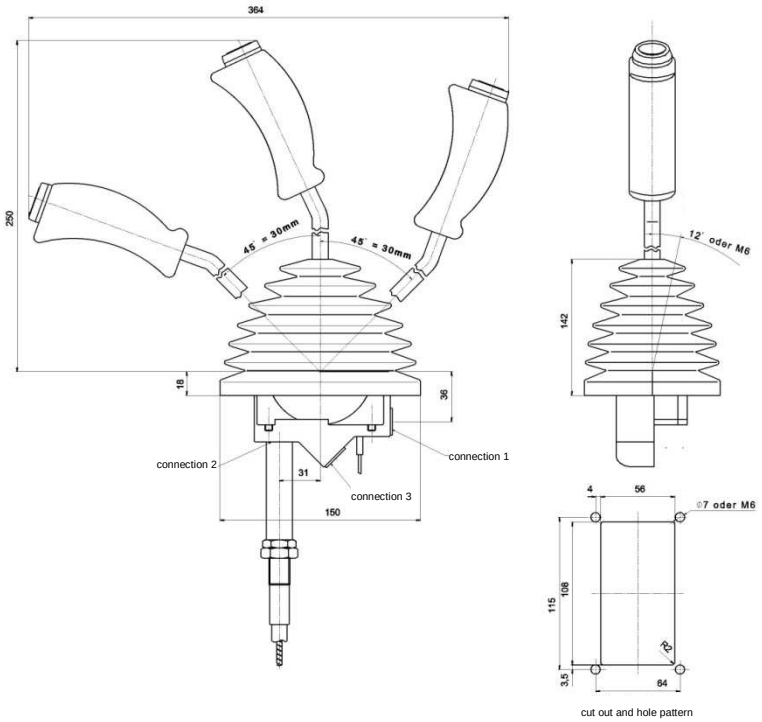
Mechanical Data	
Max. pivoting angle	± 49°
Ratio	1° = 0,72 mm
Max. stroke	68 mm
Cable types	type A, B and K
Maintenance-free	
Fixing	2x screws M6

Options
Form-locking brake notch

Operation limits and verifications	
Maximum load	pull 1300 N, push 600N

Control lever 4

The meflex lever HG4 is qualified as a drive transmitter for tandem rollers. Its defined positions for neutral/brake setting and end stop for forward and backward, which can optionally transferred by a proximity switch, guarantees a secured handing with explicit feedback.



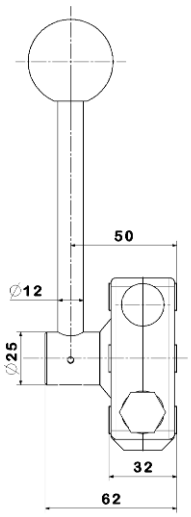
Mechanical Data	
Max. pivoting angle	± 45°
Ratio	1° = 0,66 mm
Max. stroke	60 mm
Handle power	adjustable
Cable types	type A, B and K
Maintenance-free	
Fixing	4x screw M6

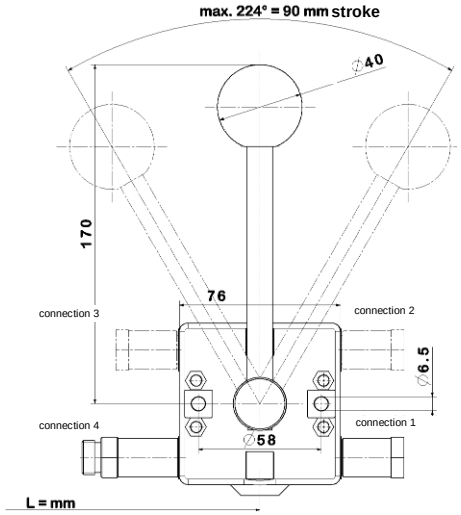
Operation limits and verifications	
Density of mechanical components	splash-proof
Density of electrical components	IP67
Maximum load	pull 1300 N, push 600 N

Options
Zero position notch
Form-locking brake notch
Mechanical locks in intermediate positions
Inductive proximity switch • Start interlock • Back-up warning • Vibration switch-off • Parking break
Push button in handle

ZK - Geber

The meflex ZK control lever is an extremely durable gear rod lever which can be used to realize long strokes and large transmission powers. Due to numerous options, such as locking positions and spring provisions it can be compiled individually for each application.





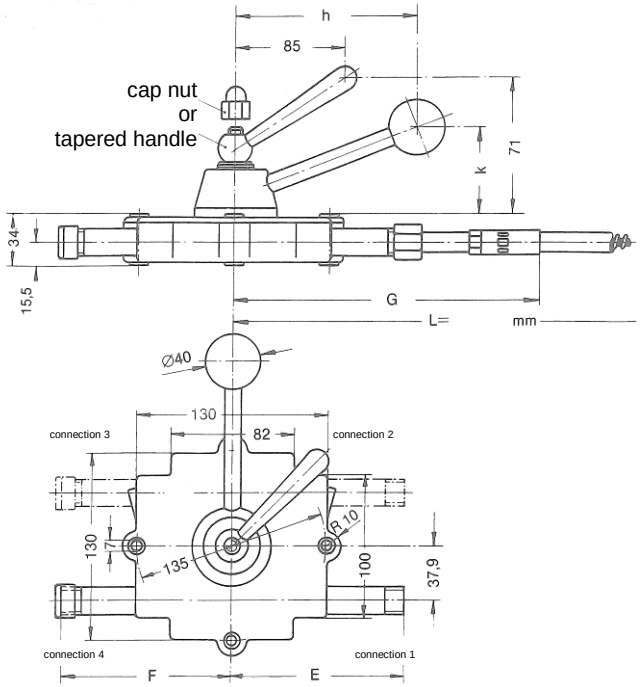
Mechanical Data	
Max. privoting angle	224°
Ratio	1° = 0,403 mm
Max. stroke	90 mm
Cable types	type A, B and C
Maintenance-free	
Fixing	2x scew M6
Length of lever	customized

Operation limits and verifications	
Density	splash-proof
Maximum load	pull 1300 N, push 600 N

Options
Friction; adjustable optionally
Ball notch
Positive notch
Fastenable in all settings
Spring return
Load torque interlock
Dual tangential version

EZ – Lever

The meflex EZ – Lever can be used without considering environmental influences as an drummer control for truck mixers. The self-locking function as well as the switch positions are infinitely adjustable. The double tangent type reaches two switching operations or interlocking processes within one lever movement.



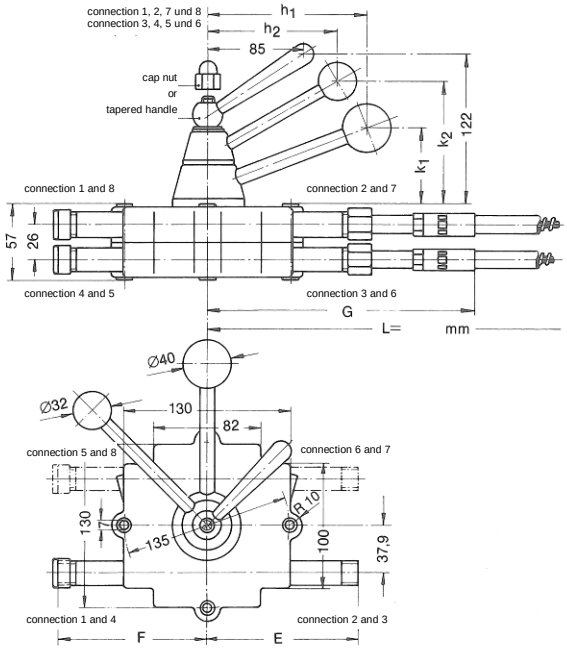
Mechanical data	
Max. privoting angle	335°
Ratio	1° = 0,628 mm
Max. stroke	210 mm
Cable types	type A, B, C and D
Maintenance-free	
Fixing	4x screw M6
Lever length	customized

Operation limits and verifications	
Density	splash-proof
Maximum load	pull 5000 N, push 3500 N

Options
Self locking; optionally adjustable
Ball notch
Positive notch
Fastenable in all settings
Anti-backdrive device
Double tangent type

DZ – Lever

The features und applications of the meflex DZ-Lever are corresponding to the EZ-Lever. Due to two independent operating lever handles two switching or locking operations are possible. The one or two defined switch positions are easy to find due to noticeable notches. The levers stick in the determined position.
The resetting to the starting position is guaranteed because of the spring return.



Mechanical data	
Max. privoting angle	335°
Ratio	1° = 0,628 mm
Max. stroke	210 mm
Cable types	type A, B, C and D
Maintenance-free	
Fixing	4x screw M6
Lever length	customized

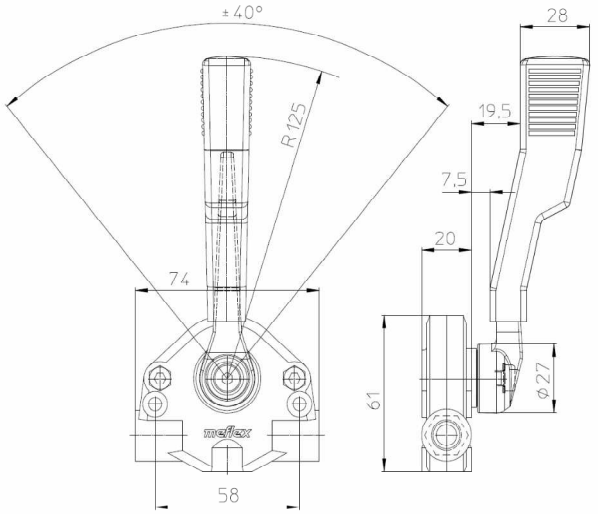
Operation limits and verifications	
Density	splash-proof

Options
Self locking; optionally adjustable
Ball notch
Positive notch
Fastenable in all settings
Anti-backdrive device
Double tangent type

Electronical control levers

Z40e control lever

The Z40e control lever has been developed as a mechanical/electronic variant of the tried and tested very durable meflex Z40 control lever. The Z40e control lever has been designed as a gas controller and can be used for all machines in the construction-building industry.
The contactless and wear-free signal intake is based on the Hall-sensor technique. The signal is being transmitted by a three-conductor wire with a flexible protection tube and high-strength cable gland sealing the interfaces.
Same as before the driver triggers the control movements via a sturdy mechanism but the Z40e control lever does not forward them mechanically. Sensors take the command in and forward it as analogue signal to the machine control unit.
The pivoting angle of the lever is max ± 40°.
Upon request any positions can be fitted with non-positive notches.
An outstanding feature of the Z40e control lever is its small and compact design.



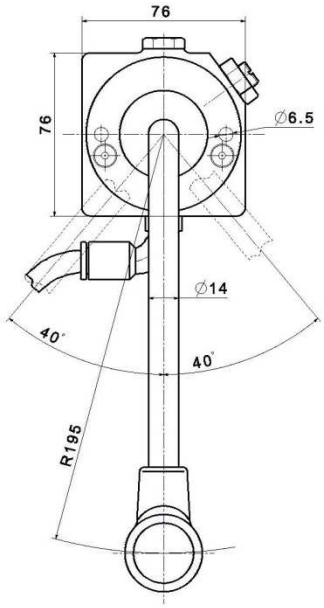
Mechanical data	
Max. pivoting angle	± 40°
Self-retention	
Maintenance-free	
Durability	1 Mio. reversal of load
Any lever position can be fixed by non-positive notches according to the customers request	

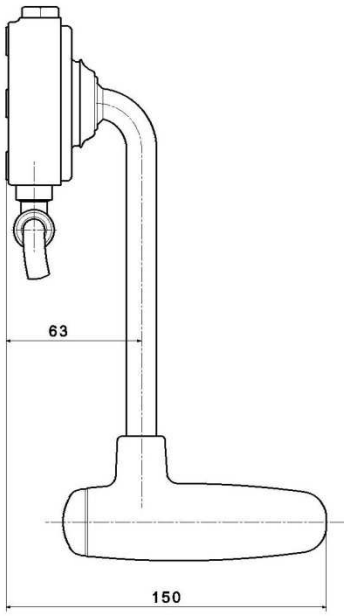
Operation limits and verifications	
Temperature range	- 40°C to + 80°C
Vibration resistance	acc. to DIN EN 60 068-2-6
EMC	acc. to DIN 13309
Tightness housing	IP 54
Tightness sensor	IP 67

Electronic data
Signal intake by Hall-Sensors
Operating-voltage range 4,5V to 5,5V DC
Output voltage 0,5V to 4,5V (at 5V operational voltage DC) ratiometric proportional
Output voltage 0,5V (at 5V operational voltage DC)
Current consumption max. 10mA
Pin assignment sensor: Output signal……white +5V……..red Earth……..blue Standard plug connection : Deutsch

ZKe – control lever

The ZKe control lever has been developed as a mechanical/electronic variant of the tried and tested very rugged meflex ZK control lever. The very diverse application options, e g as gas controller, drive controller or drum controller in concrete-mixer vehicles characterize the ZKe control lever.
The contactless and wear-free signal intake is based on the Hall-sensor technique. The signal is being transmitted by a three-conductor wire with a flexible protection tube and high-strength cable gland to seal the interfaces.
As opposed to the ZK control lever, the ZKe takes the control movements in by a sensor and transmits them to the machine control unit via an analogue signal.
There are several fitment options. Upon request any positions can be fixed with non-positive notches and arbitrary functions of the switch key can be set at the control handle with input and output signal.
The pivoting angle of the lever is max ± 40°.





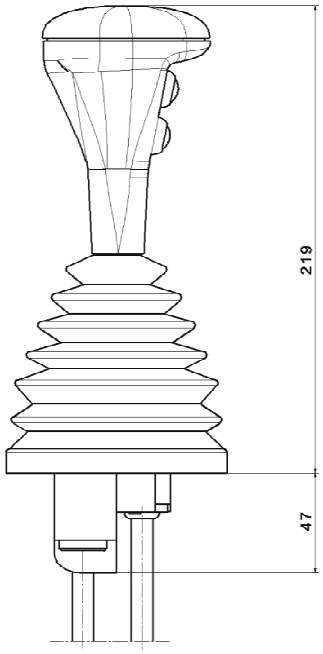
Mechanical data	
Max. pivoting angle	± 40°
Self-retention	
Maintenance-free	
Durability	1 Mio. reversal of load
Any lever positions can be fixed by non-positive notches according to the customers request	

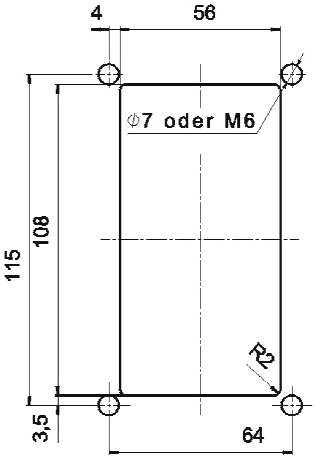
Operation limits and verifications	
Temperature range	- 40°C to + 80°C
Vibration resistance	acc. to DIN EN 60 068-2-6
EMC	acc. to DIN 13309
Tightness complete lever	IP67

Electronic data
Signal intake by Hall-Sensors
Operating-voltage range 4,5V to 5,5V DC
Output voltage 0,5V to 4,5V (at 5V operational voltage DC) ratiometric proportional
Centre position at output voltage 2,5V (at 5V operating voltage DC)
Power consumption max. 10mA
Pin assignment sensor: Output signal……. white +5V……..red Earth… ……..blue
Lever push button (optional), 10A resistive, 250 V, 50 000 operation cycle **2x switch connection…black**

HG4e – transmitter

The meflex HG4e lever is developed as a drive transmitter for tandem rollers. Its defined positions for neutral- / brake setting and end stop for forward and backward, guarantees a secured handing with explicit feedback. The position of the lever is collected contact-free by a hall sensor and exported as an analog voltage signal.





Cut out and hole pattern

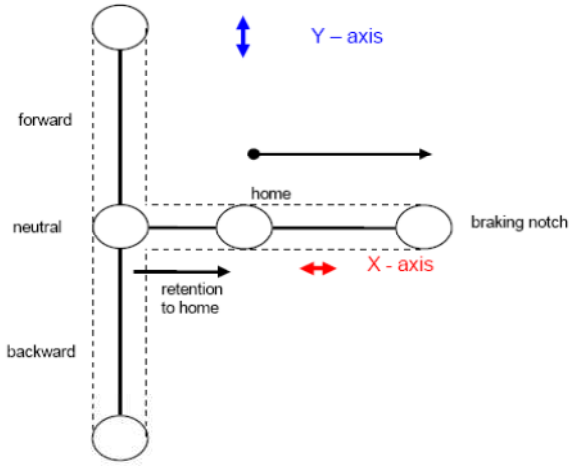
Mechanical Data	
Max. pivoting angle	± 40°
Self-retention	
Maintenance-free	
Durability	1 Mio.reversal of load
Actuated notch in middle position	
Fixing	4x screw M6

Operation limits and verifications	
Temperature range	- 40°C bis + 80°C
Vibration resistance	acc. to DIN EN 60 068-2-6
EMC	acc. to DIN 13309
Tightness housing	IP 54
Tightness sensor	IP 67

Electronic data
Signal intake by Hall-Sensor
Operating-voltage range 4,5V to 5,5V DC
Output voltage 0,5V to 4,5V (at 5V operational voltage DC) ratio metric proportional
Centre position at output voltage 2,5V (at 5V operating voltage DC)
Power consumption max. 10mA
Pin assignment sensor: Output signal…….white +5V……..red Earth……blue
Redundant neutral position via hall switch
Linearity mistake taken from ± 40°……..± 1,5°
Offset temperature drift……..0,3 mV/°C

Mechatronic – transmitter

The meflex mechatronic transmitter is a mechanic/electronic traction/brake control lever, which has been developed mainly for the requirements of the building machine industry. It combines the advantages of the reliable mechanics of our „Transmitter 4“ with the latest standards of the CANBus-Technology.
The driver triggers the control movements via a sturdy mechanism. Sensors take his command in and forward it electronically to the machine.
Depending on its specification, the meflex mechatronic transmitter is suitable for traditional signal transmission as well as for CAN-technology.



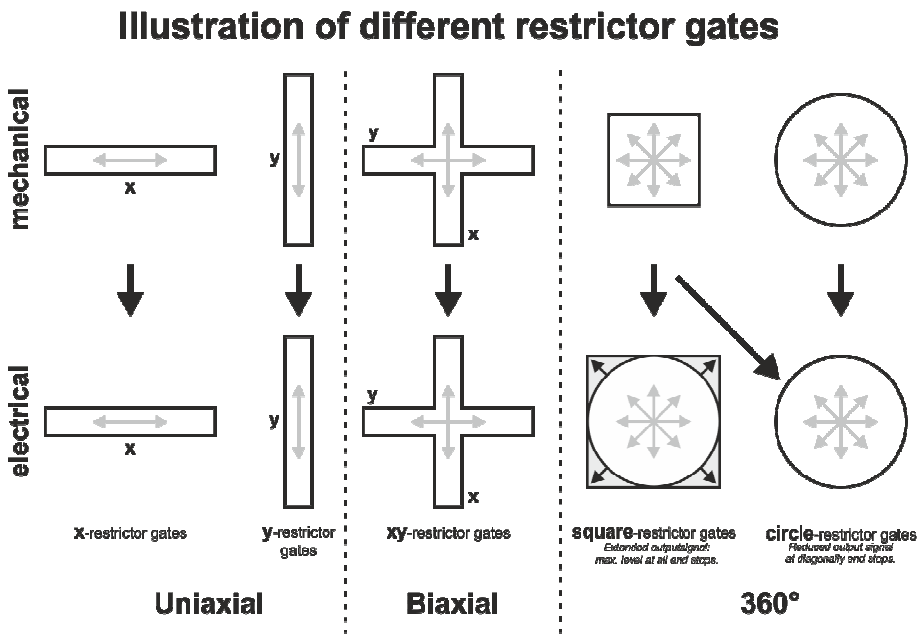
Mechanical data	
pivoting angle	Y-axis ± 35°, X-axis 12°
Positive notch in parking position (50N ± 20N)	
Spring return from neutral position into home position	
Adjustable self-retention in Y-axis	
Suitable for RH and LH installation	
Maintenance-free	
Durability	1 Mio. reversal of load

Operation limits and verifications	
Operating temperature	- 25°C to + 80°C
Vibration resistance acc. to DIN EN 60 068-2-6, DIN EN, 60068-2-27 and DIN EN 60068-2-29	
EMC acc. to DIN 13309	
Seal tightness, above floor acc. to IP67 and below floor acc. to IP64	
Tropicalised acc. to DIN EN50016 and DIN EN 60068-2-30	
Operation reliability acc. to DIN EN 500-1, DIN EN 500-4 and DIN EN 60204-1	

Electronic data
CANBus-capable, Can Open DS301/DS401, optional J1939
Signal intake by Hall-Sensors
10 Bit in Y-axis, electrical resolution between the stop positions
Soft-/Firmware can be updated, respectively adjusted, later (LIN Bootloader)
Operational voltage 8 to 32V DC/ 0,5A, nominal 24V DC
2A-Highside driver for brake etc. (short-circuit-proof, overload-proof)
Brake signal redundant to CAN-Bus as Highside-output
Optional 6 or 8 buttons in handle, digital output
Interface to machine by 2 connectors, type: Deutsch (other brands on request), 3. connector as optional equipment for the following I/O extension 10 digital inputs 24V/ 10mA 2 digital outputs 24V/ 10mA reference voltage 5V/ 250mA for analog inputs

Electronic Joystick

The Electronic Joystick is due to its modular construction from a one-axis up to a 360° transmitter available. Depending on the version customized notches and self-retention are obtainable. The maximum pivot angle for each axis is ± 20°. A redundant version of the output signal is also an option. The output signals can be transmitted according to CANopen or J1939.



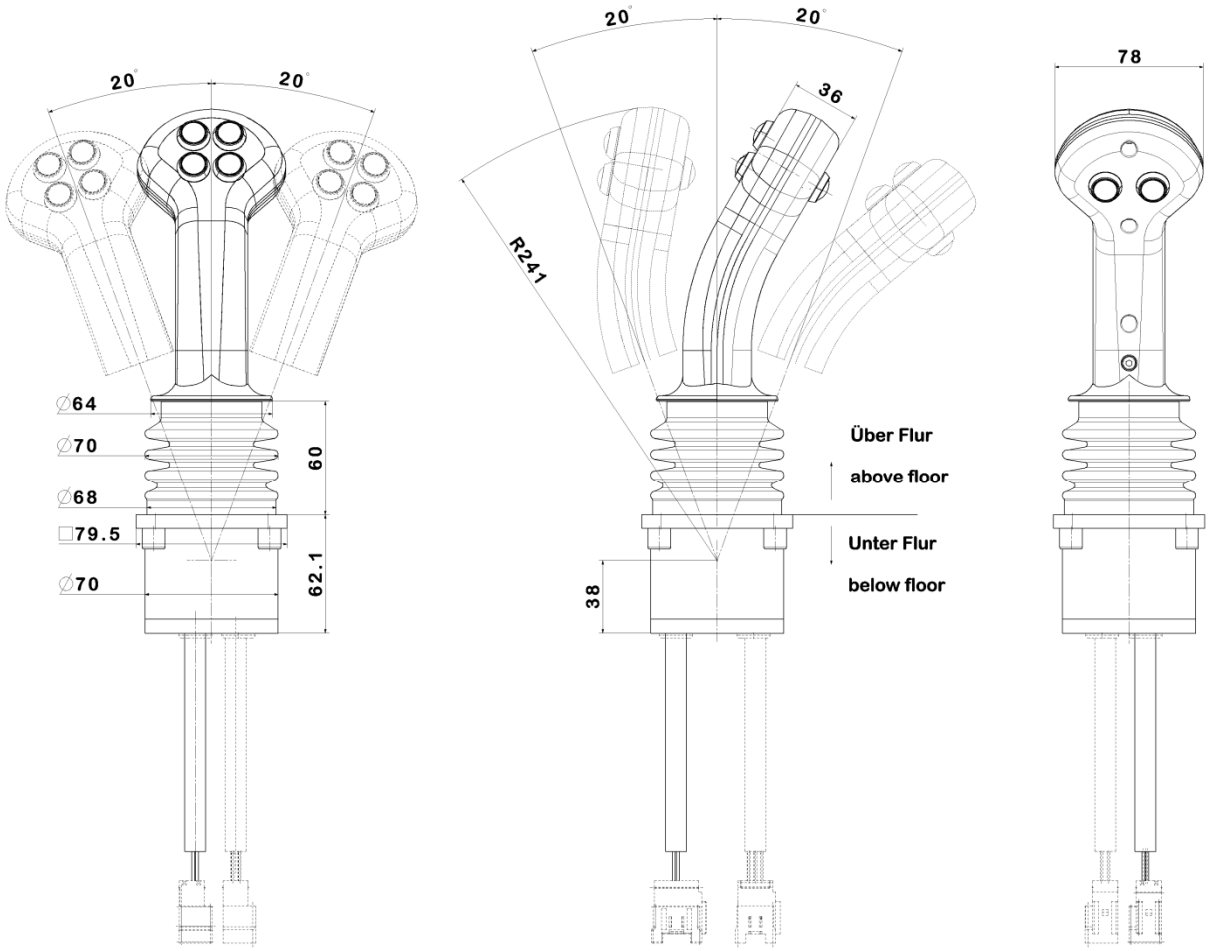
Mechanical Data
1 axis, 2 axis or 360° pivot angle
Pivot angel of each axis ± 20°
Suitable for left or right side
Maintenance-free

Operating limits and verifications
Temperature range - 40°C to + 80°C
Vibration resistance acc. to DIN EN 60 068-2-6
EMC acc. to DIN 13309
Tightness above floor IP 67
Tightness below floor IP 54 (optional)

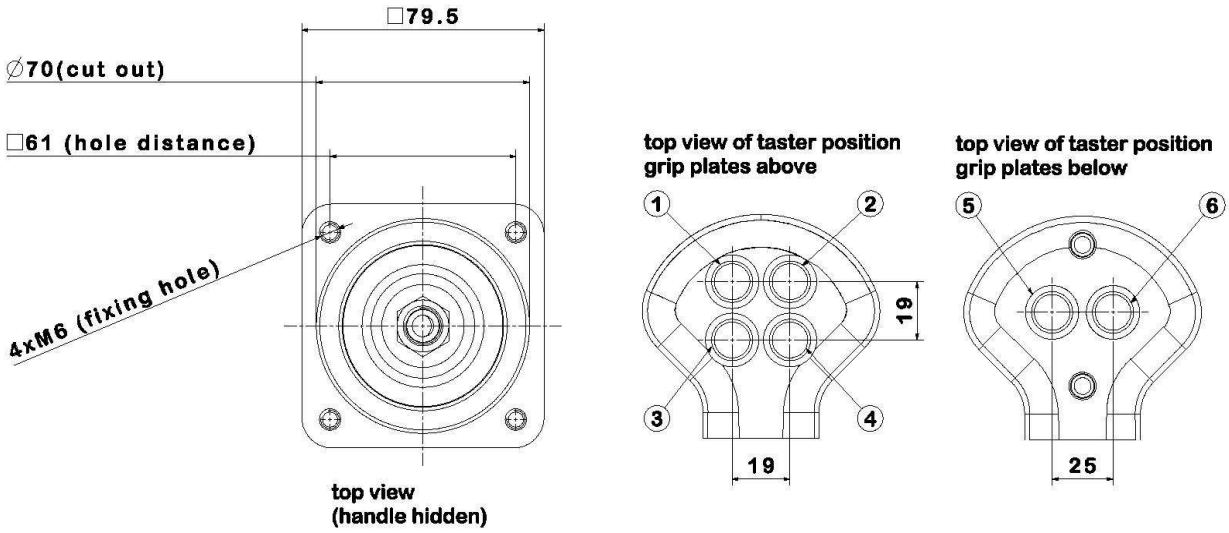
Electronic Data (analog version)
Signal intake by redundant Hall-Sensor
Operating voltage range (V_{DD}) 4,5V to 5,5V DC
Output voltage range 0,5V to 4,5V (at operating voltage V_{DD} = 5V / DC) ratio metric for X-axis and Y-axis
Center position at output voltage 2,5V (at 5V operating voltage DC) for X-axis and Y-axis
Power consumption max. 15mA
Linearity mistake taken from 20° …….. ± 0,3°
Offset temperature drift……....± 0,3 %/V_{DD} for X-axis and Y-axis

Electronic Data (CAN version)
Signal intake by redundant Hall-Sensor
Operating voltage range (V_{DD}) 8V bis 36V DC
Output signal CAN 2.0b
Protocol CANopen oder J1939
Power consumption max. 100mA
Linearity mistake taken from 20°……....± 0,3°
Offset temperature drift……....± 0,3 %/V_{DD} for X-axis and Y-axis

Dimensions

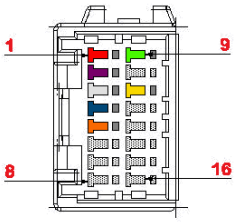


Cut out and hole pattern

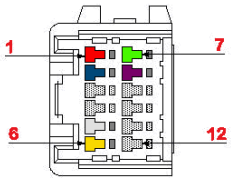


Optional plug connection

pin assignment of 16-pole plug (button)		
cable colour	button position	plug position
red	3	1
green	4	9
orange	2	5
blue	1	4
white	5	3
purple	6	2
yellow	shared connection	11



pin assignment of 12-pole plug (sensor)		
cable colour	function	plug position
red	5V	1
blue	earth	2
white	Out 1_2	5
yellow	Out 1_1	6
green	Out 2_1	7
purple	Out 2_2	8



Specification push-buttons

		analog version	CAN-version
Circuit	SPST-NO-DB		
Travel (nominal)	2,3 mm		
Life (nominal)	1.000.000 cycles mechanical		
Life (nominal)	500.000 cycles electrial		
Operating force (nominal)	3N		
Contact bounce (nominal)	1 millisecond		
Dielectric strength	1.000 VAC		
Insulation resistance	1 GΩ		
Contact resistance	50 mΩ max (initial)		
Switching power (max)	16 VA AC		
Electrial Rating:			
Current	Voltage		
400 mA	32 VAC Res		
100 mA	50 VDC Res		
125 mA	125 VAC Res		

Variants

	feature	1 axis	2 axis	360°
Basic	*Handle*	Standard	Standard	Standard
	Bellow	Standard	Standard	Standard
	Control elements	2 x push buttons	2 x push buttons	2 x push buttons
	Notch	Center position	Center position	
	Spring return			yes
	Self-retention	Standard	Standard	Standard
	Cable length	150 mm	150 mm	150 mm
	Tightness above floor	IP 67	IP 67	IP 67
	Output signal	Analog	Analog	Analog
Optional	*Handle*	Customized	Customized	Customized
	Bellow	Customized	Customized	Customized
	Control elements	Customized	Customized	Customized
	Notch	Customized	Customized	
	Spring return	Customized	Customized	Customized
	Output signal	Redundant	Redundant	Redundant
	Connector	Customized	Customized	Customized
	Self-retention	Customized	Customized	
	Cable length	Customized	Customized	Customized
	Tightness below floor	Customized	Customized	Customized
	Output signal	CANopen oder J1939	CANopen oder J1939	CANopen oder J1939

Complete push-pull systems

Meflex offers the production of complete push-pull systems. As these products are very customer-specific, please contact us. We would like to advise you about this subject.

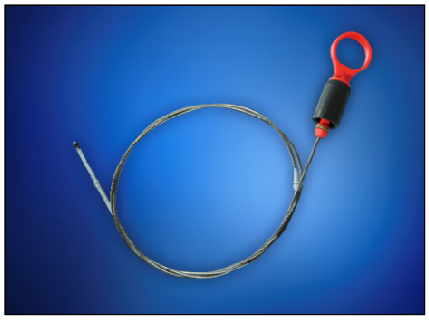
Some examples for complete push-pull systems below.

Seat console with a version of a double control lever

Complete connecting rod for hand-operated roller

Oil dipsticks and cables

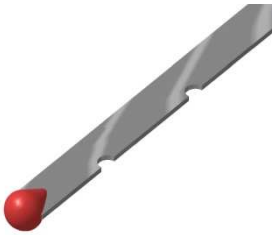
meflex Oil dipsticks and cables are especially designed for application in trucks and commercial vehicles. The flexible structure of the cables makes them ideal also for long lengths and complex layings. High temperatures which occur in vehicles often standing or driving slowly do not cause problems due to the choice of high-quality materials.
Using different manufacturing processes, we are able to make the parts at low cost no matter it's a small or very big quantity. Furthermore, we are also offering our sticks and cables as a complete system, including necessary tubes and add-on parts, so that they can be mounted directly during final assembly.



Operation limits and verifications
Zinc-plated metal parts or stainless steel
Tubes made of plastic or zinc-plated steel with add-on parts for easy mounting at final assembly
Sealing at the plastic handle with O-ring seals
Plastics especially suited for motor oil
Temperature resistance up to 140°C

Options
Part number identification
Laser marking on sheet metals
Handles and measuring areas can be designed individually upon request, different colours are available.
To stabilize the oil measuring cables in the guide rails additional plastic parts can be moulded (this is recommended for bigger lengths)

Different lay-outs of oil dip sticks and cables:

Variants	Wire w/moulded measuring tip	Oil dip stick	Wire with pressed-on stick
			
Laying	Three-dimensional	Two-dimensional	Three-dimensional
Radii	Rmin 80 mm	Rmin 120 mm	Rmin 100 mm
Measuring area	Moulded plastic part	Stamped, punched or lasered	
Handle	Moulded plastic part		
Ideal for	Big lengths (up to more than 2 m) with complex laying and big quantities	Short to mid-lengths with simple laying, also for lower quantities	Mid to big lengths with complex laying and low quantities