



4...20 mA



HART®-module



PROFIBUS



display module



switching module



TYPE EL
APRIL 2006



Features

- Modular pressure transmitter with diaphragm seal technology
- Output signal:
 - 4...20 mA, can be retrofitted with
 - HART® protocol (rev. 6), option
 - PROFIBUS PA, option
- Function modules
 - Multifunctional display with 5-segment digital display and bar graph
 - Switching module with 2 floating channels, maximum 0.5 A switching current, electrically isolated at all sides, without additional auxiliary power
- Function module replacement on site without recalibration "plug and measure"
- Limits of measuring range 0.2 bar to 40 bar
- Accuracy: $\leq 0.15\%$
- Turndown 5:1
- Degree of protection IP 66
- Piezoresistive measuring cell directly aerated, fully welded
- Hygienic design according to EHEDG, FDA and GMP recommendations
- Material and surface quality according to the hygienic requirements
- G1A process adapter with elastomer-free hygienic process connection, rotary thread adapter suitable for HYGIENIC process adapter

Options

- Explosion protection for gases and dust
- Classification per SIL 2
- Inspection certificates
 - material certificate as per DIN EN 10204-3.1
 - calibration certificate as per DIN EN 10204-3.1

Application area

- Food industries
- Pharmaceutical
- Biotechnology

Application

The modular pressure transmitter PASCAL CV is suited for measuring the relative and absolute pressures of gases, vapors and liquids. The use of a HYGIENIC process adapter allows the device to be deployed in a variety of processes. The design based on module technology/variable adapter means lower inventories over the longer term.

HYGIENIC adapter, variable



welded socket



Clamp socket



tapered coupling with union nut



Varivent

Technical Data**Instrument ranges**

nominal range	Turndown	measuring ranges	measuring spans ²		overload limits	vacuum tight at < 50 °C ¹
			min. span	max. span		
1 bar	5 : 1	-1...+1 bar	0.2 bar	2 bar	3 bar	40 mbar abs
4 bar		-1...+4 bar	0.8 bar	5 bar	10 bar	20 mbar abs
16 bar		-1...+16 bar	3,2 bar	17 bar	60 bar	20 mbar abs
40 bar		-1...+40 bar	8 bar	41 bar	100 bar	20 mbar abs
4 bar abs		0...4 bar abs	0.8 bar abs	4 bar abs	10 bar abs	20 mbar abs
16 bar abs		0...16 bar abs	3.2 bar abs	16 bar abs	60 bar abs	20 mbar abs

¹ Long-term vacuum measurements at temperatures above +50°C may cause changes in the properties of the measurement device. Vacuum-proof designs are available upon request.

² calibrated measuring span for devices with PROFIBUS PA basic module

**Housing design**

Housing	hygienic housing design with screw cap
Material	housing: stainless steel mat.no. 1.4301 window: Macrolon gasket: NBR O-ring
Construction	two-chamber system, minimum housing volume, excellent moisture and condensate protection
Pressure compensation	PTFE filter system
Degree of protection	EN 60529, IP 66
Climatic category	DIN EN 60721 3-4, 4K4H
Electrical connection	· screwed terminals 1 mm ² , cable entry fitting through screwing · circular connector M 12
Weight	standard device without function modules approx. 0.65 kg

Process connection

Process connection (transmitter)	G1A with hygienic elastomer-free process connection; can be positioned as required by means of the rotary thread adapter
Tightening torque	20 Nm, max. nominal pressure 10 bar 50 Nm, max. nominal pressure 50 bar
Material	socket st. steel mat.-no. 1.4404 diaphragm st. steel mat.-no. 1.4436
Surface quality	compliant with hygiene specifications
Process adapter	variable HYGIENIC adapter
Variants/material	s. order code, other options upon request

Measuring system

Sensor	piezoresistive measuring element
System filling	foodstuff oil FD1 (USDA-H1) acc. to FDA

Temperature ranges

Ambient temperature	-20 to 85°C
Process temperature	0...140 °C
Allowed storage temperature	-20...85 °C

Note safety values as per examination certificate!

Supply

Basic module	4...20mA	PROFIBUS PA
Standard design	12...40 VDC	9...32 V DC

Certificates/tests

EMC directives	2004/108/EC
Noise immunity	EN 61326 EN 61000
Interference emission	EN 55011
Ex approval	TÜV 04 ATEX 2387 X II 1/2 G Ex ia IIC T4/T5/T6 (gas) II 2 G Ex ia IIC T4/T5/T6 (gas) II 2 D Ex iaD 21 T 80 °C (dust)

SIL Level 2 for basic module 4...20 mA, switching module, display module and HART module.

Output

General	
Delay time	approx. 160 ms
Measuring cycle	6 measurements / second
Meas. range setting	Turndown 5:1
Basic module: 4...20 mA	
Signal	4...20 mA, 2-wire
Current range	3.8...20.8 mA
Current limitation	approx. 22 mA
Alarm state	< 3,6 mA, optional > 21 mA
Damping	0...120 seconds
Load	$R \leq \frac{U - 12 V}{22.5 mA}$ (Ohm)
Basic module: PROFIBUS PA	
Output signal	digital output signal IEC 61158-2
Protocol	EN 50170 - PROFIBUS PA, Profile 3.0
Sensor address	0...126 (126 = factory setting)
Power consumption	constantly 11 mA
Fault current I _{FDE}	2 mA
Damping	0...300 seconds
Parameterization	SIMATIC PDM

Accuracy

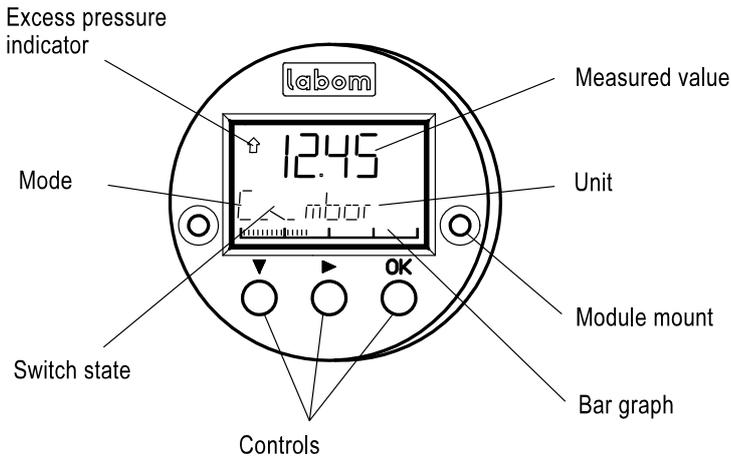
General	
Limit point setting	DIN 16086
Reference conditions	DIN EN 60770-1
Calibration position	vertical mounting position
Linearity errors	≤ 0.15 % of span TD 5:1 no modification ≤ 0.05 % of nominal range
Hysteresis	≤ 0.05 % of nominal range
Repeatability	≤ 0.05 % of nominal range
Influence of mounting position	≤ 3.5 mbar
Long-term drift	≤ 0.1 % year of nominal range
DIN EN 60770-1	
Temperature effect	
a) case	
Lower range value / upper range value	
range 0...60 °C	± 0.15 %/10 K of nominal range
range <0°C, >60°C	± 0.2 %/10 K of nominal range
b) process connection (diaphragm seal)	
approx 1 m bar/10 K	

The specified zero error for the process connection is a guide value for a standard design. We can provide a detailed system calculation upon request.

Function modules

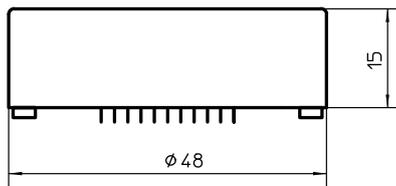
Display module (multifunctional display) optional

pluggable with automatic module detection - plug and measure -



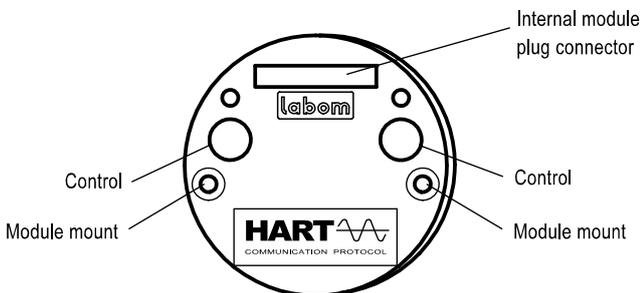
- Module housing made of ABS, encapsulated electronics unit
- Many operating mode menus
- 5-segment pressure read-out with unit
- Read-out display
 - pressure (standard)
 - percent *
 - current *
 - sensor temperature
- Bar graph 36 segments $\hat{=}$ 0...100%
- Measuring circuit test (current sensing function) *
3.55...22.0 mA *
- Alarm indicator on display
- Switching function indicator (with switching module) *

* not with basic module PROFIBUS PA

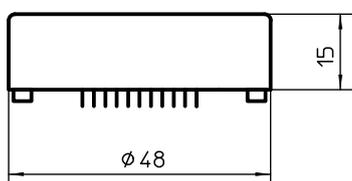


Operator menus	
4...20 mA	PROFIBUS PA
meas. range selection	min-max-value
damping	pressure trimming
min-max-value	system-info
characteristic	factory data reset
pressure units	BUS address
measuring circuit test	
alarm state	
current trimming	
pressure trimming	
table function	
system info	
factory data reset	
switch points	
hysteresis	
switching function	
HART address	
Current mode	

HART module, optional (for basic module 4...20 mA)

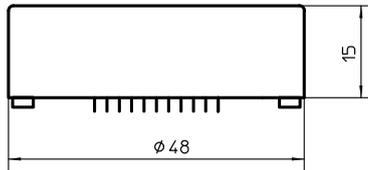
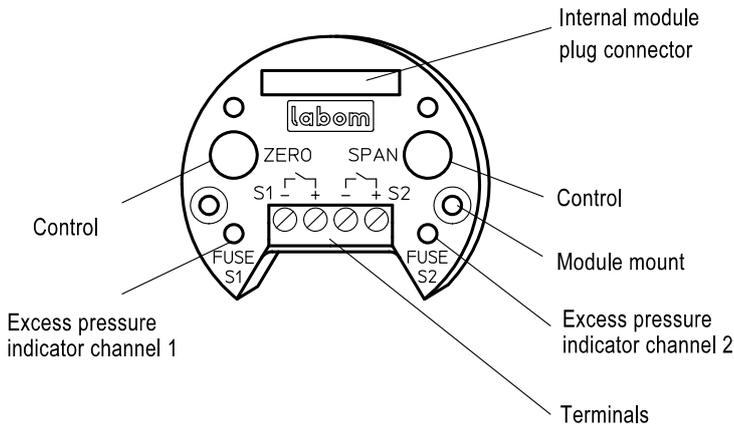


- HART protocol, revision 6.5
- Response characteristic FSK
- Load with HART communication
 - with HART modem 230...500 Ω
 - with HART communicator 230...1100 Ω
- Parameterizing by
 - operating elements
 - HART communication
 - PDM 6.0
 - AMS
 - 375 Field Communicator



Switching module, optional (not with basic module PROFIBUS PA)

pluggable with automatic module detection - plug and measure -

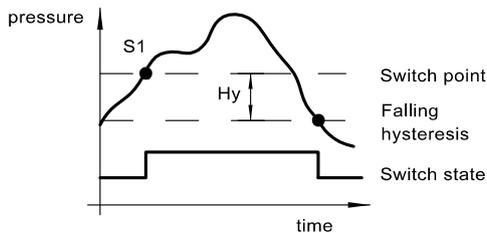


- No additional auxiliary power required
- Module housing made of ABS, encapsulated electronics unit
- Electronic switch for 2 limit values, voltage free, short-circuit-proof
- Switching capacity 30 V DC / 0.5 A ($R_i < 0.3 \Omega$)
- Overload indicator: LED red, overload or short-circuit
- Fusible cut-out at overload /short-circuit with automatic reset
- Switch points: 0.0 - 100.0% adjustable
Standard: 50.0%
- Switching function: maker or breaker, adjustable
Standard: breaker
- Device of circuit: contact open
- Hysteresis: 0.0% to 100.0%, adjustable
standard: 0.1%
falling or rising, adjustable,
standard: falling
- Switching rate: 6 Hz
- Electrically isolated to all sides
Insulation voltage: 500 V, 2.5 kV/2 sec.
- Electrical connection: terminal blocks 1 mm²

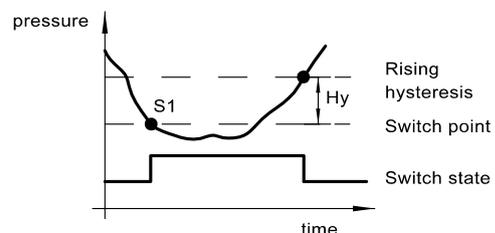
Profibus module description and HART® connection upon request

Hysteresis functions

- falling hysteresis -



- rising hysteresis -



Parameterizing

The module selected determines which parameters can be set.

operating menus	display of display module	parameter		basic module: 4...20 mA				basic module: PROFIBUS PA		
		variability	standard	basic module	switching module	display module	HART®-module	basic module	display module	PDM
zero point *	RANGE / Zero	see instrument ranges	nominal range	x	x	x	x	—	—	x
measuring span *	RANGE / Span	see instrument ranges	nominal range	x	x	x	x	—	—	x
damping	DAMP	4...20 mA: 0...120 sec.	0.0 sec.	w	—	x	x	—	—	x
		Profibus: 0...300 sec.								
min-max-value	HI / LO	pressure and temperature resetable	—	—	—	x	x	—	x	x
characteristic	FUNC	linear, table	linear	w	—	x	x	—	—	x
pressure unit	UNIT	bar, mbar, kPa, MPa, mmH2O, mH2O, kg/cm ² , PSI	bar	w	—	x	x	—	w	x
measuring circuit test	LOOP	3.55...22 mA	—	—	—	x	x	—	—	—
alarm state	ALARM	<3.6 mA, >21.0 mA	<3.6 mA	w	—	x	x	—	—	—
current trimming	I-CAL	-2 %...+5 %	—	—	—	x	x	—	—	—
pressure trimming	P-CAL	zero point -50...+50 % of n.r. span -10...+10 % of n. range	—	—	—	x	x	x	x	x
table function	TABLE	2...31 points int able	0 % = 4 mA 100 % = 20 mA	—	—	x	x	—	—	—
system info	INFO	software, serial number, revision level	—	—	—	x	x	—	x	x
factory data reset	RESET	—	—	—	—	x	x	—	x	x
BUS address	BUS	0...126	126	—	—	—	—	w	x	x
switch points	SWCH1(2)	0.0...100.0 % of nominal range	50 %	—	x	x	x	—	—	—
hysteresis	SWCH1(2)/Hyst.	0.0...100.0 % of nominal range	0.1 % hyster.falling	—	w	x	x	—	—	—
switch function	SWCH1(2)/SwTyp	breaker, maker	breaker	—	w	x	x	—	—	—
HART address	HART/Adres	0...63	0	—	—	x	x	—	—	—
HART current	HART/CUrr	fixed/float	FLOAT	—	—	x	x	—	—	—
write protection	—	ON, OFF	OFF	x	x	x	x	x	x	x

x = configurable

w = factory setting

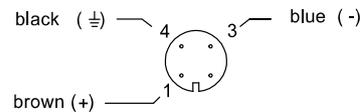
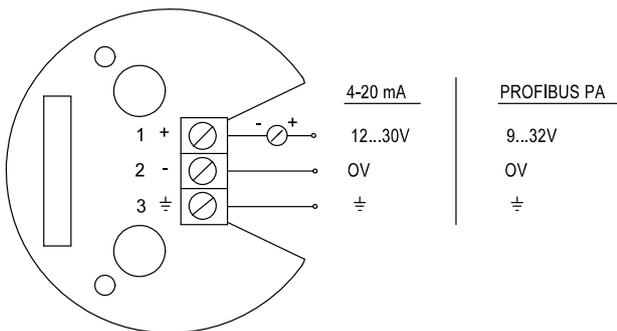
* = calibrated measuring span for devices with PROFIBUS PA basic module

Connection diagram

Basic module: 4...20 mA / PROFIBUS PA

Internal terminals with cable gland design

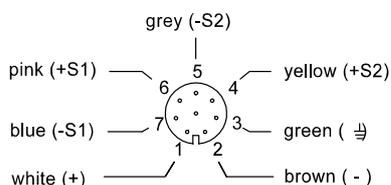
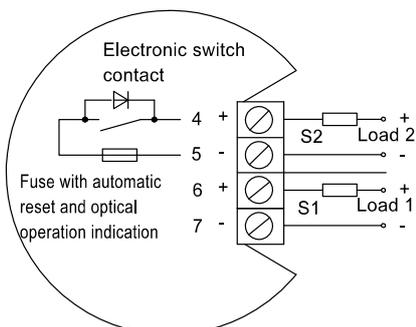
Circular connector ¹



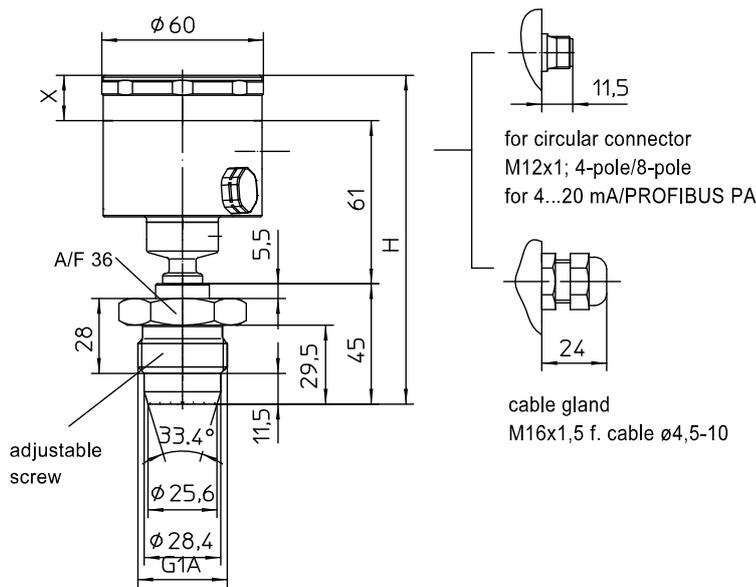
Switching module (only with basic module: 4...20 mA)

Internal terminals with cable gland design

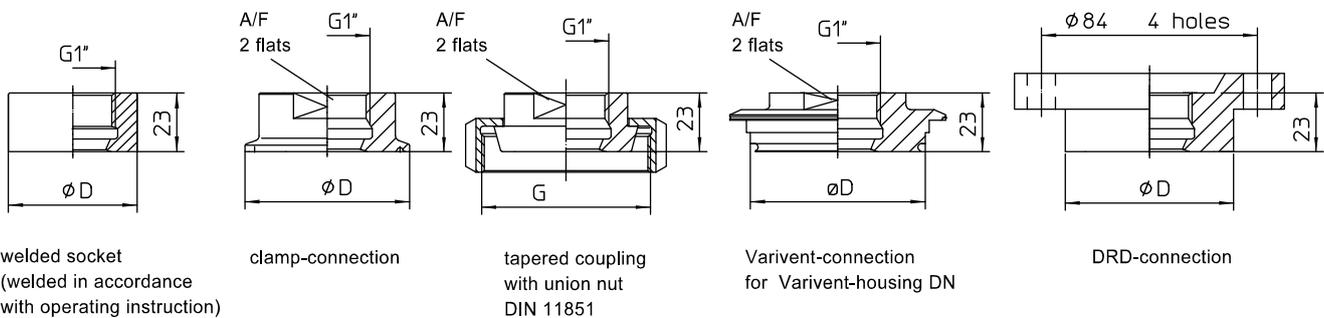
Circular connector ¹



¹ color code as Binder series 763

Dimensions/Designs**Housing**

housing design	type / X	H
- basic module: 4...20 mA with 1 function module (option) - basic module: PROFIBUS PA	17	120.5
- basic module: PROFIBUS PA with display module (option)	25	128.5
- basic module: 4...20 mA with 2 functions modules (option)	32	135.5

Process adapter

design	DN	PN	Ø D/G	A/F	order code	
welded socket	38	40	50.0	-	MC1510-K4010-E1	
clamp-connection	ISO 2852	33.7	16	50.5	41	MC1510-K1810-E3
		38 (1 1/2")	16	50.5	41	MC1510-K1810-E3
		40	16	64.0	46	MC1510-K1811-E3
		51 (2")	16	64.0	46	MC1510-K1811-E3
	DIN 32676	32	16	50.5	41	MC1510-K1810-E3
		40	16	50.5	41	MC1510-K1810-E3
		50	16	64.0	46	MC1510-K1811-E3
		50	16	64.0	46	MC1510-K1811-E3
Tri-Clamp	1 1/2 "	16	50.5	41	MC1510-K1810-E3	
	2"	16	64.0	46	MC1510-K1811-E3	
tapered coupling with union nut	DIN 11851	32	40	Rd.58x1/6	41	MC1510-K1120-E3
		40	40	Rd.65x1/6	41	MC1510-K1130-E3
		50	25	Rd.78x1/6	46	MC1510-K1140-E3
Varivent-connection for Varivent-housing DN	40-125 (1 1/2"-6")	10-25	68.0	46	MC1510-K2030-E3	
DRD-connection	50	40	65.5	-	MC1510-K2110-E3	

Order Details - please give additional specifications for models not listed -

Pressure transmitter PASCAL CV with variable HYGIENIC adapter			CV311 .								
explosion protection	· without		0								
	· Ex-protection, types of ex-protection as follows		1								
nominal range	1 bar		A1053								
	4 bar		A1056								
	16 bar		A1059								
	40 bar		A1061								
	4 bar abs		B1056								
	16 bar abs		B1059								
measuring range	0 to nominal range, unit: bar (Standard)		F10								
	0 to nominal range, unit: mbar		F11								
	0 to nominal range, unit: kPa		F22								
	0 to nominal range, unit: MPa		F23								
	0 to nominal range, unit: mmH2O		F30								
	0 to nominal range, unit: mH2O		F32								
	0 to nominal range, unit: kg/cm ²		F41								
	0 to nominal range, unit: psi		F50								
	set from... to... unit (please fill in details) not with PROFIBUS PA		F80								
adjusted and calibrated from to, unit (pls.fill in details), see below for calibration report		F81									
output signal	4...20 mA, rising characteristic (standard)		H11 . .								
	20...4 mA, falling characteristic		H15 . .								
	4...20 mA with HART function module, HART protocol rev. 6		H21 . .								
	setting ¹	damping	0.0 sec. (Standard)	0							
			0.0...120.0 sec., set to (please fill in)	1							
		alarm state	< 3.6 mA (standard)	0							
		> 21.0 mA	1								
PROFIBUS PA, IEC 61158-1, Profile 3.0		H41									
display module	without		M1								
	multifunctional display with 5-position digital display and bar graph, pluggable		M2								
switching module (not with PROFIBUS PA)	without switching module		N10								
	switching module with 2 contacts, pluggable, switching capacity 30 V DC / 0.5 A		N5 .								
	setting 1)	standard, s."Techn. description of switching module" at the factory, specify as required		0 1							
electrical connection	circular connector	M 12x1 (4 pin)	T30								
		M 12x1 (8 pin - required for switching module)	T31								
	cable gland	M16x1.5	· polyamide black	T20							
			· brass nickel-plated	T21							
· stainless steel			T22								
G1A process adapter with hygienic process connection (elastomer-free)		K80									
order code (example):			CV3110	A1051	F11	H1100	M2	N10	T20	K80	

additional features (to be indicated in case of need, only)

explosion protection ²	·  II 2 G Ex ia IIC T4/T5/T6, II 2 D Ex iaD 21 T 80 °C , Standard	S68
	·  II 1/2 G Ex ia IIC T4/T5/T6	S66

certificates

material certificate as per DIN EN 10204-3.1, wetted parts	W1020
inspection certificate as per DIN EN 10204- 3.1, calibration certificate with 5 measuring points	W1201
SIL 2 certificate ³	W2602

accessories HYGIENIC adapter, variable

design	process connection/nominal width	material st. steel	
welded socket	Ø 50 mm, DN 38, G1", HYGIENIC, no gasket	mat.-no. 1.4404	MC1510-K4010-E1
clamp connection Ø 50,5 mm	ISO 2852, DN 33.7	mat.-no. 1.4435	MC1510-K1810-E3
	ISO 2852, DN 38 (1 1/2")		
	DIN 32676, DN 32/DN 40		
clamp connection Ø 64 mm	Tri-Clamp, DN 1 1/2"		MC1510-K1811-E3
	ISO 2852, DN 40		
	ISO 2852, DN 51 (2")		
tapered coupling with union nut DIN 11851	DIN 32676, DN 50	MC1510-K1140-E3	
	Tri-Clamp, DN 2"		
	DN 32		
Varivent connection DRD-connection	DN 40	MC1510-K1120-E3	
	DN 50	MC1510-K1130-E3	
DRD-connection	D = 68 mm for Varivent-housing DN 40...125 (1 1/2"...6")	MC1510-K1140-E3	
	DN 50	MC1510-K2030-E3	
			MC1510-K2110-E3

¹ extensive parameterization is possible when the transmitter is operated with the display module, the HART function module or the PROFIBUS module.² Ex-design not possible with switching module³ not with PROFIBUS PA