

# Injection System VMU plus



**Threaded Stud VMU-A**  
for concrete and brickwork



**Threaded Stud VM-A**  
1 meter length, to be cut to the required length for concrete and brickwork



**Threaded Stud VMU-AMH**  
for perforated brick with perfo sleeve



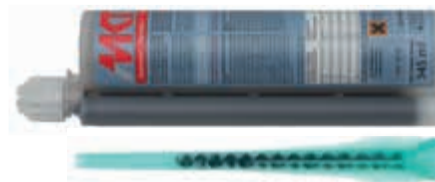
**Perfo Sleeve VMU-SH**  
for perforated brick



**Cartridge VMU plus 150**  
suitable for silicone guns  
Content: 150ml



**Cartridge VMU plus 280**  
suitable for silicone guns  
Content: 280ml, including 2 mixers, attached to the cartridge



**Cartridge VMU plus 345**  
Side-by-side cartridge  
Content: 345ml



**Cartridge VMU plus 410**  
Coaxial cartridge  
Content: 410ml



**Cartridge VMU plus 825**  
Side-by-side cartridge  
Content: 825 ml  
With big mixer VM-XL and reducers / extension tube for drill holes from 12mm diameter



**Range of loading: 0,3 kN – 202,0 kN**  
**Concrete quality: C20/25 - C50/60**  
**Brickwork: Solid and perforated brick**  
**Material: Steel zinc plated, hot dip galvanized, Stainless steel A4/316**  
**On request: Stainless steel HCR**

### Description

The injection system VMU plus is a new universal injection system for almost all applications and materials. Besides the use in non-cracked concrete and masonry, VMU plus is also approved for fixings in cracked concrete and for post installed rebar connections. To complete the fastening, various anchor rods or internal sleeves can be used from the existing MKT-range (VMU-A, VM-A and VA), as well as standard threaded rods or reinforcing bars. In perforated brick, a perfo sleeve is required.

### Advantages

- Only one mortar for almost all applications, more flexibility, less inventory, greater application security
- approved for cracked (M12-M30) and non-cracked concrete (M8-M30)
- approved for post-installed rebar connections (Ø8-Ø32)
- approved for solid and perforated brickwork
- approved with standard threaded studs (strength test required)
- base material temperature during installation -10°C (concrete) to +40°C
- environmental temperature when completely cured -40°C to +120°C (concrete)
- variable anchorage depth for less drilling efforts
- fire test report
- opened cartridges can be re-used with a new mixer nozzle
- styrene-free vinyl ester resin
- Approved application in wet or water-filled drill holes (M8-M16)
- Approved to use under seismic action according to the performance category C1

NEW



**Applications**

**Fastenings in cracked and non-cracked concrete:**

Base plates, supports, mounting of joint tapes, shelves, brackets, railings, facade substructures, wooden structures, cable trays, etc.

**Fastenings with rebars in cracked and non-cracked concrete - with shear forces:**

Shear connectors, wall connecting reinforcement, concrete overlay

**Post-installed rebar connections:**

Ceiling and wall connections, structural reinforcement, structural complement building extensions, connection of balconies and canopies, subsequent attaching of „forgotten“ reinforcing bars

**Fastenings in Brickwork:**

Canopies, door and window frames, facade substructures, battens, gates etc.



**Injection Cartridge VMU plus**



- Two component cartridge, styrene-free
- Approved for non-cracked concrete and brickwork

Description	Ref. No.	Content ml	Cont. of master box pcs	Weight per master box kg	Weight per piece kg
Cartridge VMU plus 150	28255271	150	12	4,20	0,34
Cartridge VMU plus 280 <sup>1)</sup>	28252401	280	12	6,70	0,56
Cartridge VMU plus 345	28254001	345	12	8,00	0,65
Cartridge VMU plus 410	28256041	410	12	10,1	0,83
Cartridge VMU plus 825	28259001	825	8	13,0	1,63
Static mixer VM-X	28305111	-	12	0,12	0,01
Static mixer VM-XL <sup>2)</sup>	28305201	-	10	0,28	0,03
Mixer extension VM-XE 10/200 (200mm)	28306011	-	12	-	0,01
Mixer extension VM-XE 10/500 (500mm)	85951101	-	10	0,02	0,02

One static mixer VM-X as well as one screw-on cap comes with each cartridge. (VMU plus 825: VM-XL)

Usable length of static mixer see page 85.

<sup>1)</sup>Cartridge VMU 280 comes with 2 mixers.

<sup>2)</sup>With larger cross section for larger drill holes or post-installed rebar connections.

**Curing Time Injection Adhesive VMU plus**

- Cartridge temperature when installing min. +5°C

Temperatur (°C) im Bohrloch	Verarbeitungszeit	Aushärtezeit	
		trockener Beton	feuchter Beton
≥ +40°C <sup>1)</sup>	1,5 min	15 min	30 min
≥ +35°C <sup>1)</sup>	2 min	20 min	40 min
≥ +30°C <sup>1)</sup>	2,5 min	25 min	50 min
≥ +25°C <sup>1)</sup>	4 min	45 min	90 min
≥ +20°C	6 min	45 min	90 min
≥ +10°C	15 min	80 min	160 min
≥ +5°C	25 min	2 h	4 h
≥ 0°C <sup>2)</sup>	45 min	7 h	14 h
≥ -10°C <sup>1)2)</sup>	90 min	24 h	48 h

<sup>1)</sup>Cartridge temperature ≤ +20°C

<sup>2)</sup>Processing brickwork ≥ +5°C

<sup>3)</sup>Cartridge temperature ≥ +15°C

The hole must be cleaned directly prior to the installation of the anchor.



**Stock-Box**

- In stackable multi-purpose container
- Stock-Box, the container for various items

Description	Ref. No.	Contents	Quantity pcs.	Weight per Box kg
Stock-Box VMU plus 345	28999640	Cartridge VMU plus 345 Static mixer VM-X	20 40	15,3
Stock-Box VMU plus 410	28999652	Cartridge VMU plus 410 Static mixer VM-X	20 40	18,0

**Dimensions Stock-Box**

Description	Height mm	Width mm	Depth mm
Stock-Box	220	400	300

Chemical Anchors

## Accessoires

### Cleaning brush RB M6



- With connection thread M6
- Extensions for large depths
- For drilling machines with keyed chuck or with SDS plus adaptor for SDS plus drills

Description	Ref. No.	Suitable for drill hole Ø mm	Total length of brush mm	Suitable for		Pkg. cont. pcs.	Weight per piece kg
				Threaded stud	Internally threaded sleeve		
RB 10 M6	33510101	10	130	M8	-	1	0,05
RB 12 M6	33512101	12	140	M10	Ø8	1	0,05
RB 14 M6	33514101	14	180	M12	Ø10	1	0,05
RB 16 M6	33516101	16	200	-	Ø12	1	0,05
RB 18 M6	33518101	18	200	M16	Ø14	1	0,05
RB 20 M6	33520101	20	220	-	Ø16	1	0,05
RB 24 M6	33524101	24	250	M20	Ø20	1	0,06
RB 26 M6	33526101	25,26	290	-	Ø20	1	0,06
RB 28 M6	33528101	28	260	M24	Ø22	1	0,06
RB 32 M6	33532101	32	350	M27	Ø24,25	1	0,08
RB 35 M6	33535101	35	350	M30	Ø28	1	0,08
RB 40 M6	33537101	40	350	-	Ø32	1	0,08
RBL M6	33968101	Brush extension 150 mm with connection thread M6				1	0,09
RBL M6 SDS	33350101	SDS Plus adapter with internal thread (M6)				1	0,06

### Blow-out pump VM-AP



- Drill hole cleaning up to 240mm drill hole depth or up to Ø 20mm diameter

Description	Ref. No.	Suitable for maximum depth of drill hole mm	Pkg. cont. pcs.	Weight per piece kg
VM-AP 360	33200101	330	1	0,27

## Accessories injecting

### Retaining Washer VM-IA



- For bubble-free filling of the drill hole
- Suitable for extension tubes VM-XE and VM-XLE

Description	Ref. No.	Suitable for drill hole Ø mm	Color	Suitable for		Pkg. cont. pcs.	Weight per pkg. kg
				Threaded stud	Rebar		
VM-IA 14	85914201	14	black	M12	Ø10	20	0,02
VM-IA 16	85916201	16	black	-	Ø12	20	0,02
VM-IA 18	85918201	18	black	M16	Ø14	20	0,02
VM-IA 20	85920201	20	black	-	Ø16	20	0,06
VM-IA 24	85924101	24	black	M20	Ø20	20	0,06
VM-IA 25	85925201	25	black	-	Ø20	20	0,06
VM-IA 28	85928101	28	black	M24	Ø22	20	0,08
VM-IA 32	85932201	32	black	M27	Ø24, 25	20	0,08
VM-IA 35	85935201	35	black	M30	Ø28	20	0,08
VM-IA 40	85938201	40	black		Ø32	20	0,08

### Cleaning brush RB-H 18

with handle



- Drill hole cleaning in solid and hollow base material

Description	Ref. No.	Suitable for drill hole Ø mm	Length of brush mm	Pkg. cont. pcs.	Weight per piece kg
RB-H 18/250	29918501	10-16	250	1	0,04
RB-H 18/400	33618101	10-16	400	1	0,05

### Air gun VM-ABP



- Drill hole cleaning with compressed air for holes up to one meter

- For best drill hole cleaning the nozzle of the air-gun must reach to the bottom of the drill hole

Description	Ref. No.	Nozzle Ø mm	Max. Drill hole depth mm	For drill hole Ø mm	Pkg. cont. pcs.	Weight per piece kg
VM-ABP 1000	85806101	14	1000	16-40	1	0,32

### Air gun VM-ABP



- Drill hole cleaning with compressed air for holes deeper than 240mm or larger than Ø 20mm diameter

- For best drill hole cleaning the nozzle of the air-gun must reach to the bottom of the drill hole

Description	Ref. No.	Nozzle Ø mm	Suitable for maximum depth of drill hole mm	For drill hole Ø mm	Pkg. cont. pcs.	Weight per piece kg
VM-ABP 250	33100101	16	240	18-40	1	1,00
VM-ABP 500	33106101	10	480	18-40	1	1,30

### Extension tubes

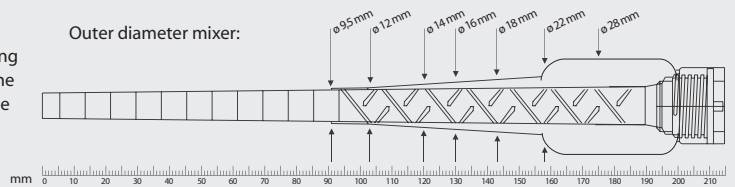


- Extension tubes for deeper drill holes
- Two diameters available

Description	Ref. No.	Length mm	Ø mm	To use in conjunction with	Pkg. cont. pcs.	Weight per pkg. kg
VM-XE 10/200	28306011	200	10	VM-XL, VM-X, VM-XP	12	0,12
VM-XE 10/500	85951101	500	10	VM-XL, VM-X, VM-XP	10	0,20
VM-XLE16/250	85959101	250	16	VM-XL	10	0,30
VM-XLE16/1000	85956101	1000	16	VM-XL	10	1,15

**Usable length Static mixer VM-X/VM-XP**

Drill holes must always be filled from the bottom of the hole to ensure no air pockets are trapped in the mortar. This is only possible when the tip of the mixing nozzle reaches the very bottom of the drill hole before injecting the mortar. If the mixing nozzle does not reach the bottom of the drill hole, a mixer extension tube must be used.



**Possible combinations static mixer / Extension tube / Retaining Washer:**



**Dispenser VM-P Profi**



- ➔ Professional dispenser with an ideal center of gravity for more comfortable working
- ➔ Automatic pressure release for minimum mortar overrun

Description	Ref. No.	Suitable for cartridge	Pkg. cont. pcs	Weight per piece kg
VM-P 345 Profi	28350511	150ml, 280ml, 300ml, 345ml also suitable for silicone cartridges	1	1,00
VM-P 380 Profi	28351001	380ml, 410ml, 420ml	1	1,10

**Dispenser VM-P Standard**



- ➔ For occasional use, metal version
- ➔ Piston rod with adjusting screw

Description	Ref. No.	Suitable for cartridge	Pkg. cont. pcs	Weight per piece kg
VM-P 345 Standard	28350505	150ml, 280ml, 300ml, 345ml also suitable for silicone cartridges	1	1,00
VM-P 380 Standard	28353005	380ml, 410ml, 420ml	1	1,15

**Dispenser VM-P Pneumatic**



- ➔ Professional air tool with an optimum center of gravity and quick cartridge exchange
- ➔ Automatic pressure release system reduces mortar overrun to a minimum
- ➔ Single-hand pressure regulation to adjust the piston speed

Description	Ref. No.	Suitable for cartridge	Pkg. cont. pcs	Weight per piece kg
VM-P 345 Pneumatic	28350601	345ml max. working pressure 8 bar, 40l/min	1	2,41
VM-P 380 Pneumatic	28352002	380ml, 410ml, 420ml max. working pressure 8 bar, 40l/min	1	2,00

Chemical Anchors

**System case and accessories for post-installed rebar connections to use with injection system VMU plus (fast curing time) or the injection system VME (long curing times, optimized for very large and deep drill holes)**

**Description and content:**

Compact system case including equipment for every rebar diameter as well as all the tools necessary for the installation of post-installed rebar connections using the Injection System VME or VMU plus. All parts also sold separately.



**Drilling:**

- Drilling aid device
- Flat- / Ring wrench

**Accessories for drill hole cleaning:**

- 1 of each air hose RS 25 and RS 35
- 1 of each blow-out nozzle RD 12/14, 16/18, 20/25, 30/35
- 1 of each cleaning brush RB 12 M8 – RB 35 M8
- Connection set RS with air valve and connector
- 5 Brush extensions RBL M8, L = 500 mm
- 1 SDS-plus adapter RBL M8-SDS

**Accessories for injection:**

- 5 Static mixer VM-XL
- 5 of each retaining washer VM-IA Ø12 mm - Ø35 mm
- 5 of each extension tube VM-XE 10/500 and VM-XLE 16/500
- Frame saw

**Other:**

- Approval
- Installation sheet and Installation report (available for download at [www.mkt.de](http://www.mkt.de))
- Filling quantity tables
- Adhesive tape
- Measuring tape
- Thermometer
- Ear protection, Breathing protection, Protective goggles and protective gloves

Description	Ref. No.	Suitable for drill hole-Ø mm	Pkg. content pcs.	Weight per piece kg
VME System case	85999101	12 - 35	1	11,8

**System Components**

- Filling of drill hole
- For drill hole diameter 12 - 35 mm

Description	Ref. No.	Length mm	Rebar-Ø mm	Suitable for drill hole Ø mm	Colour	Package content pcs.	Weight per pck. kg
<b>Extension pipe</b>							
VM-XE 10/1000	85952101	1000	8 - 12	12 - 16	white	10	0,30
VM-XE 10/2000	85954101	2000	8 - 12	12 - 16	white	10	0,65
VM-XLE 16/1000	85956101	1000	14 - 28	18 - 35	grey	10	1,15
VM-XLE 16/2000	85958101	2000	14 - 28	18 - 35	grey	10	3,50
<b>Retaining washer (only for post-installed rebar connections. Fits to the system case)</b>							
VM-IA 12	85912101	-	8	12	white	20	0,04
VM-IA 14	85914101	-	10	14	yellow	20	0,01
VM-IA 16	85916101	-	12	16	blue	20	0,02
VM-IA 18	85918101	-	14	18	black	20	0,01
VM-IA 20	85920101	-	16	20	grey	20	0,02
VM-IA 25	85925101	-	20	25	green	20	0,05
VM-IA 32	85932101	-	25	32	brown	20	0,10
VM-IA 35	85935101	-	28	35	red	20	0,12

Extension pipe VM-XE and VM-XLE can be cut to corresponding drill hole depth.  
Extension pipe > 2000 mm on demand.

**Reinforced brushes RB M8**

- Reinforced brushes with connecting thread M8 for deeper drill holes

Description	Ref. No.	Rebar-Ø mm	Suitable for drill hole Ø mm	Pkg. content pcs.	Weight per piece kg
RB 12 M8	85812101	8	12	1	0,05
RB 14 M8	85814101	10	14	1	0,05
RB 16 M8	85816101	12	16	1	0,05
RB 18 M8	85818101	14	18	1	0,05
RB 20 M8	85820101	16	20	1	0,05
RB 25 M8	85825101	20	25	1	0,06
RB 32 M8	85832101	25	32	1	0,08
RB 35 M8	85835101	28	35	1	0,08
Brush extension RBL M8, L= 500 mm	85871101	8 - 28	12 - 35	1	0,32
SDS-Plus adapter RBL M8 SDS	85881101	-	12 - 35	1	0,07

Please select Brush extension RBL and SDS-Plus adapter according to depth of drill hole.  
For drill hole depth > 500 mm, the proper number of Brush extensions must be connected.

**Blow-out nozzle**



- Every nozzle covers two drill hole diameters
- Fits on the air hose RS

Description	Ref. No.	Rebar-Ø mm	Suitable for drill hole-Ø mm	Pkg. content pcs.	Weight per piece kg
Blow-out nozzle RD 12/14	85852101	8 - 10	12 - 14	1	0,01
Blow-out nozzle RD 16/18	85854101	12 - 14	16 - 18	1	0,02
Blow-out nozzle RD 20/25	85856101	16 - 20	20 - 25	1	0,03
Blow-out nozzle RD 30/35	85858101	24 - 28	30 - 35	1	0,05

**Air hose**



- Two diameters, pre-assembled set with connectors
- To use with air valve and blow-out nozzle

Description	Ref. No.	Rebar-Ø mm	Suitable for drill hole-Ø mm	Pkg. content pcs.	Weight per piece kg
Air hose RS 25 (2 m)	85802101	8 - 20	12 - 25	1	0,10
Air hose RS 35 (3 m)	85804101	24 - 28	30 - 35	1	0,40

**Air Valve**



- For drill hole cleaning with compressed air

Description	Ref. No.	Rebar-Ø mm	Suitable for drill hole-Ø mm	Pkg. content pcs.	Weight per piece kg
Connection Set RS with valve and connector	85890101	8 - 28	12 - 35	1	0,40



**Extract from Permissible Service Conditions of ETA-11/0415**

Approved loads for single anchor without influence of spacing and edge distance in dry or wet concrete.

Approved loads for temperature range -40°C to +120 °C please see approval ETA-11/0415. Total safety factor as per ETAG 001 included ( $\gamma_M$  und  $\gamma_P$ ).

Injection System VMU plus, reinforcement bars B500B				ø8	ø10	ø12	ø14	ø16	ø20	ø25	ø28	ø32
Range of anchorage depths	$h_{ef,min} - h_{ef,max}$	[mm]		60-160	60-200	70-240	75-280	80-320	90-400	100-480	112-540	128-640
Approved loads, tension for $h_{ef,min} - h_{ef,max}$				cracked concrete								
Range of temperature	24°C/40°C <sup>1)</sup>	C20/25 appr. N	[kN]	-	-	5,8-19,7	7,2-26,9	8,8-35,1	12,2-54,9	14,3-82,3	16,9-122,5	20,7-166,0
	50°C/80°C <sup>1)</sup>	C20/25 appr. N	[kN]	-	-	4,2-14,4	5,2-19,5	6,4-25,5	9,0-39,9	12,5-59,8	16,9-84,8	20,7-114,9
Approved loads, tension for $h_{ef,min} - h_{ef,max}$				un-cracked concrete								
Range of temperature	24°C/40°C <sup>1)</sup>	C20/25 appr. N	[kN]	7,2-13,8	9,0-21,6	11,7-31,2	13,0-42,4	14,3-55,4	17,1-86,6	20,0-135,2	23,7-169,6	29,0-217,0
	50°C/80°C <sup>1)</sup>	C20/25 appr. N	[kN]	5,4-13,8	6,7-21,6	9,4-31,2	11,8-42,4	14,3-55,4	17,1-86,6	20,0-119,7	23,7-131,9	29,0-153,2
Approved loads, shear for $h_{ef,min} - h_{ef,max}$				cracked concrete								
Range of temperature	24°C/40°C <sup>1)</sup>	C20/25 appr. V	[kN]	-	-	13,8-14,5	17,3-19,8	21,1-25,9	29,3-40,4	34,3-63,1	40,6-79,2	49,7-103,4
	50°C/80°C <sup>1)</sup>	C20/25 appr. V	[kN]	-	-	10,1-14,5	12,6-19,8	15,3-25,9	21,5-40,4	29,9-63,1	40,6-79,2	49,7-103,4
Approved loads, shear for $h_{ef,min} - h_{ef,max}$				un-cracked concrete								
Range of temperature	24°C/40°C <sup>1)</sup>	C20/25 appr. V	[kN]	6,5	10,1	14,5	19,8	25,9	40,4	48,0-63,1	56,9-79,2	69,5-103,4
	50°C/80°C <sup>1)</sup>	C20/25 appr. V	[kN]	6,5	10,1	14,5	19,8	25,9	40,4	48,0-63,1	56,9-79,2	69,5-103,4

**Spacing and edge distance**

Min. thickness of concrete slab for $h_{ef,min} - h_{ef,max}$	$h_{min}$	[mm]	100-190	100-230	102-272	111-316	120-360	138-448	164-544	182-610	208-720
Minimum spacing	$s_{min}$	[mm]	40	50	60	70	80	100	125	140	160
Minimum edge distance	$c_{min}$	[mm]	40	50	60	70	80	100	125	140	160

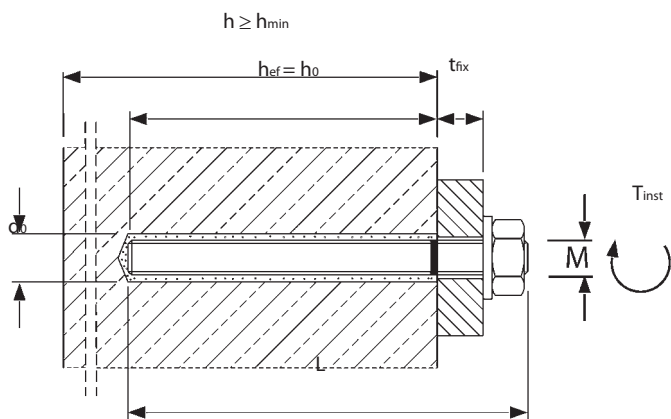
**Installation parameters**

Drill hole diameter	$d_o$	[mm]	12	14	16	18	20	24	32	35	40
Range of drill hole depth for $h_{ef,min} - h_{ef,max}$	$h_o$	[mm]	60 - 160	60 - 200	70 - 240	75-280	80 - 320	90 - 400	100 - 480	112 - 540	128-640

<sup>1)</sup> max. long term temperature / max. short term temperature

Higher concrete strength may lead to higher approved loads. Technical data for water-filled drill holes see admission.

For anchor designing, an easy to operate Software is available on request or can be downloaded at [www.mkt.de](http://www.mkt.de)



**Installation parameters and amount of mortar for post-installed rebar connections**

**Rebar connection VMU plus**

Rebar-Ø	[mm]	8	10	12	14	16	20	24	25
Drill hole-Ø	$d_o$ [mm]	12	14	16	18	20	25	32	32
Amount of mortar/ 100 mm setting depth	[m]	7,5	9,0	10,6	12,1	13,6	21,2	35,2	37,6



**Extract from Permissible Service Conditions of ETA-11/0514 for Post-installed Rebar Connections and Tension Anchor with Injection System VMU plus**

Concrete Strength		C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
Design value of bond strength $f_{bd}$ [N/mm <sup>2</sup> ]	Hammer and pneumatic drilling <sup>1)</sup>	1,6	2,0	2,3	2,7	3,0	3,4	3,7	4,0	4,3

<sup>1)</sup> Minimum anchoring lengths  $l_{a,min}$  and  $l_{s,min}$  according to DIN 1045-1:2001-07.

<sup>2)</sup> The values  $f_{bd}$  are valid for "good" bond conditions according to EN 1992-1-1:2004.

**Installation (threaded rod in concrete)**

