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TECHNICAL GUIDE

TG VT Trolley (SI/50Hz)

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1 GENERAL

The following components are included in the basic hoist configuration:

- Trolley
- Bridge panel
- Additional components:
 - Radio control or pendant control
 - Festoon electrification systems for trolley and if supplied for pendant
 - End carriages
 - Bridge drives
 - Crane power supply

The hoisting trolley frame sizes are VT9, VT10 and VT11 .

The hoisting trolleys will always be delivered with bridge panels. The bridge panels are from the H15 cubicle series. For controls there are two standard approaches, with a movable pendant or radio control and optional fixed pendant.

The hoist configuration for the VT crane components package can be one of the following:

- VT trolley hoist
- Two similar VT hoist – on separate trolleys
- Two different VT hoists – on separate trolleys

2 HOISTING TROLLEY

2.1 General

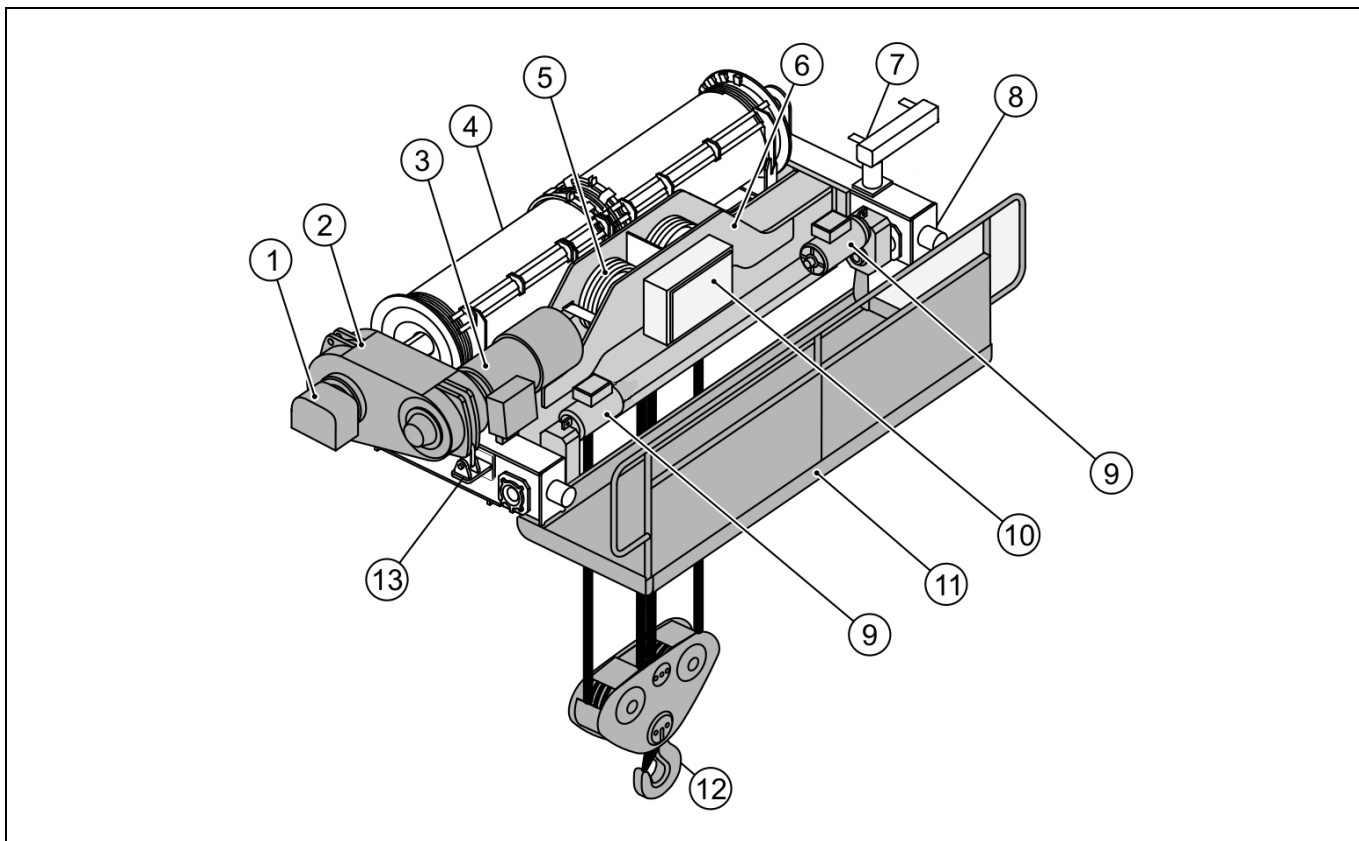
The trolley series are available with following capacity classes.

Table 1. Trolley series capacity classes

VT9	Up to	63	ton
VT10	Up to	100	ton
VT11	Up to	160	ton

The main parts of the hoisting trolley are given in figure 1.

Figure 1. Main parts of the hoisting trolley.



Item	Description	Item	Description
1	Hoisting limit	8	End carriage
2	Hoisting gear	9	Travelling machinery
3	Hoisting motor	10	Terminal box
4	Rope drum	11	Service platform
5	Rope sheaves	12	Hook block
6	Support beam	13	Travelling limit switch
7	Towing arm		

2.2 Hoisting trolley properties

2.2.1 Standard features

Feature for...	Description
Hoisting	<ul style="list-style-type: none"> • Strain gauge type overload protection • MT2, condition monitoring unit (located in bridge panel) • 4-step rotary limit switch • Weight operated stop limit switch (auto reset) • Weight operated ultimate stop limit switch (Manual reset. Load can be laid down after the stop.)
Hoist motor	<ul style="list-style-type: none"> • Inverter-duty motor with D.C. disk brake and encoder • 60 % ED (Some VT11 models with 40% ED) • F/H Insulation class (temperature rise class F and insulation class H) • IP55 protection • Bimetal type switches for thermal protection • Cooling fan
Hook	<ul style="list-style-type: none"> • Finger guard hook block • Single DIN-forging with latch • Tilted rope sheaves
Rope reeving	<ul style="list-style-type: none"> • Rope guide or overwrap protection • True vertical lift
Trolley	<ul style="list-style-type: none"> • Double girder trolley. Rail gauges 2400, 2700, 3400, 4200, 5300 [mm] (depends on frame size and height of lift) • Two travelling machineries • Polyurethane buffers • 2-step travelling limit switch
Travelling motors	<ul style="list-style-type: none"> • Two Inverter travelling motors • 60 % ED (Some VT11 models with 40% ED) • F/H Insulation class (temperature rise class F and insulation class H) • IP55 protection • Bimetal type switches for thermal protection
Electrical outfit	<ul style="list-style-type: none"> • Standard 3-phase voltages 50/60Hz: 380V...480V • Connection box (all electrics in bridge panel) • IEC / (CSA) standards • IP55 steel connection panel
Environment	<ul style="list-style-type: none"> • Standard ambient temperature +5...+40 °C • Standard altitude max. 1000m • Normal humidity and normal air purity
Surface treatment	<ul style="list-style-type: none"> • Standard surface treatment according to environmental stress category C2; EN ISO12944 (E150,SA2.5)
Marking	<ul style="list-style-type: none"> • Hoist type plate • Rope code sticker • Hoist sticker: brand name and type designation • Hook sticker: brand name and load
Documents	<ul style="list-style-type: none"> • Owner's manual • Hoist test certificate • Wire rope certificate • Hook certificate
Packing	<ul style="list-style-type: none"> • Wooden palette • Anticorrosion plastic around the hoist

2.2.2 Optional features (Standardized options)

Mechanics

- Second brake: Ready assembly surface for enclosed disc brake in the gear primary shaft (BRA01).
- Special rope lengths. Note! Only longer ropes available. Factory consulting needed.
- Hook block with Ramshorn forging (HOK03).
- Motorized hook with fixed platform.
- Lockable rotation of hook forging (4x90°) (HOK02).
- Motors thermally protected with alarm bi-metal switches (HM05, TM05).
- Anti condensation package, motors stand by heating, electrics stand by heating (MOT03, MOT04, PAN02).
- Expanded derailment catches against earthquakes etc. (OTH23).
- Storm lock device (OTH60).
- Oil drip pans (TR27).
- Power supply for lifting device (CBL02)
- Guide rollers (flangeless wheels) (OTH62).
- Rail brush assembly (OTH61).
- Auxiliary hoist not connected to main hoist, separate Q hoist.
- Buffer extension (DES29).
- Grease nipples to group (GE31).

Electrics

- Trolley anti-collision device between two trolleys (TR16)
- Sway control
- ESR (Extended Speed Range) for hoisting (SPD12).
Extended Speed Range (ESR) enables driving with speeds exceeding the nominal speed of the motor with light load. This is possible by increasing the supply frequency of the motor above nominal with the field weakening principle. At the same time the available pull-out torque reduces and full load cannot be applied. As the supply frequency is increased, the motor voltage is maintained at its nominal level and the maximum torque (the pull-out torque) is reduced proportionally roughly to the quadrature of the frequency. See hoisting design value tables.

Maintenance

- Fixed service platform.

2.3 Product code of VT hoisting trolley

VT	HOISTING TROLLEY TYPE																																												
	10 HOISTING TROLLEY BODY SIZE (GE09) 9,10, 11, 12																																												
		24 ROPE REEVING (DES27) 22, 23, 24, 25, 26, 28																																											
			YD HOISTING MOTOR CONNECTION AND SIZE (HM17, HM18) Y_ = Inverter control Y-connected _C = MF16ZR200 (VT9 & VT10) _D = MF18XR200 (VT10 & VT12) _E = MF22LR200 (VT11 & VT12)																																										
				NN HOISTING GEAR AND LAYOUT (HS06) N_ = Normal speed _N = Normal _S = Second brake (BRA01)																																									
VT	10	24	YD	NN	Y1	NG	05	08	34	1E	N																																		
TRAVELLING MOTOR CONNECTION AND SIZE (TM16, TM02) Y_ = Inverter control Y-connected (TM16 =Y) D_ = Inverter control D-connected (TM16 =D) 0_ = Fixed trolley, no travelling machinery _1 = MF07XA200K (TM02) _2 = MF10ZM200G (TM02) _3 = MF11XM200G (TM02) _0 = Fixed trolley, no travelling machinery																																													
TRAVELLING MACHINERY CODE (TG01, TG02, TG03) N_ = Normal speed gear (QM06 or VES5) _G = VES machinery M_ = Medium speed gear (QM06 or VES5) _Q = QM machinery (QM06, QM07) L_ = Medium speed gear (VES) _0 = Fixed trolley, no travelling machinery H_ = High speed gear (QM06 or VES5) U_ = Medium speed gear (QM07) T_ = High speed gear (QM07) V_ = High speed gear (QM07) 0_ = Fixed trolley, no travelling machinery																																													
DUTY CLASS CODE (DIM01) <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th rowspan="2">Duty code</th> <th colspan="4">Assembly duties</th> </tr> <tr> <th>06</th> <th>05</th> <th>04</th> <th>03</th> </tr> </thead> <tbody> <tr> <td>Number of full load lifting cycles</td> <td>250 000</td> <td>125 000</td> <td>63 000</td> <td>32 000</td> </tr> <tr> <td>EN full load working cycles</td> <td>500 000</td> <td>250 000</td> <td>125 000</td> <td>63 000</td> </tr> <tr> <td>ISO(FEM)</td> <td>M6(3m)</td> <td>M5(2m)</td> <td>M4(1Am)</td> <td>M3(1Bm)</td> </tr> <tr> <td>CMAA</td> <td>D</td> <td>C</td> <td>B</td> <td>A</td> </tr> <tr> <td>ASME</td> <td>H4</td> <td>H3</td> <td>H2</td> <td>H1</td> </tr> </tbody> </table>												Duty code	Assembly duties				06	05	04	03	Number of full load lifting cycles	250 000	125 000	63 000	32 000	EN full load working cycles	500 000	250 000	125 000	63 000	ISO(FEM)	M6(3m)	M5(2m)	M4(1Am)	M3(1Bm)	CMAA	D	C	B	A	ASME	H4	H3	H2	H1
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CMAA	D	C	B	A																																									
ASME	H4	H3	H2	H1																																									
RAIL WHEEL CODE 0_ = EN-GJS700 rail wheel 1_ = Hardened steel rail wheel (WHE06) F_ = Fixed trolley, no wheels _6 = Rail 60, guiding rail wheels UU = 66 mm (WHE03= 60) _8 = Rail 80, guiding rail wheels UU = 86 mm (WHE03= 80) _C = Rail 100, guiding rail wheels UU = 106 mm (WHE03= 100) _0 = All rail wheels flangeless guiding with guide rollers _D = Rail wheel in hoisting gear end of hoisting trolley grooved 126 mm for flat 120. _X = Fixed trolley, no wheels																																													
RAIL GAUGE (DIM05) 24 = 2400 mm (VT9, VT10) 53 = 5300 mm (VT11, VT12) 27 = 2700 mm (VT11) 58 = 5800 mm (VT12) 34 = 3400 mm (VT9, VT10, VT11, VT12) 65 = 6500 mm (VT12) 42 = 4200 mm (VT9, VT10, VT11, VT12) XX = Special rail gauge (consult factory)																																													
ELECTRICS CODE (ELE01, EL04) 1_ = 380 V 4_ = 440 V _A = Electrics standard ANSI 2_ = 400 V 5_ = 460 V _E = Electrics standard IEC 3_ = 415 V 6_ = 480 V																																													
HOISTING TROLLEY PROPERTIES N = Standard hoisting trolley without options F = Hoisting trolley with options selected from options list S = Special properties																																													

2.4 Comparison of standards

2.4.1 Hoisting machinery

Table 2. Standard requirements and design values.

	Duty	M6(3m)	M5(2m)	M4(1Am)	M3(1Bm)
ISO(FEM)	Rope Safety	5.6	4.5	4	3.55
	Rope Sheave Ratio D/d	22.4	20	18	16
	Lifetime (k=1)	3 200	1 600	800	400
EN	Rope S _R Class	S _R 6	S _R 5	S _R 4	S _R 3
	Rope force history parameter s _r	0.5	0.25	0.125	0.063
	Rope Sheave Ratio D/d	22.4	20	18	16
	Working Cycles	500 000	250 000	125 000	63 000
	Lifting Cycles (k=1)	250 000	125 000	63 000	32 000
CMAA (ASME)	Service Class	D (H4)	C (H3)	B (H2)	A (H1)
	Rope Safety	5	5	5	5
	Rope Sheave Ratio D/d, Class 6x37	20	18	16	16
	Lifetime Request [h]	10 000	5 000	2 500	1 250
Hoisting Trolley Design Values	Duty Code	06	05	04	03
	Rope Safety	5.6	4.5	4	3.6
	Rope Sheave Ratio D/d	30	24	24	24
	Lifetime Lifting Cycles (k=1)	250 000	125 000	63 000	32 000
	Rope Travel per Cycle (m)	80	63	40	25
	Rope Speed Y ¹⁾ (m/min)	50	36	34	32

1) Rope running speed just close to drum when driving nominal load at maximum speed.

2.4.2 Travelling machinery, rail wheel

Table 3. Standard requirements and hoist selections.

	Duty	M6(3m)	M5(2m)	M4(1Am)	M3(1Bm)
ISO(FEM)	Lifetime (k=1)	3 200	1 600	800	400
EN	Lifetime Cycles (k=1)	250 000	125 000	63 000	32 000
CMAA (ASME)	Service Class	D (H4)	C (H3)	B (H2)	A (H1)
	Lifetime Request [h]	10 000	5 000	2 500	1 250
Hoisting Trolley Selections	Lifetime Lifting Cycles (k=1)	250 000	125 000	63 000	32 000
	Travel per Cycle (m)	30	30	30	30

2.5 Load range and duty classes

2.5.1 Hoisting trolley range overview

Table 4. Maximum loads of the VT9 hoisting trolley series.

Duty Code	Number of Full Load Lifting Cycles (k=1)	Load [t]					
		VT922	VT923	VT924	VT925	VT926	VT928
06	250 000	10	15	20	25	30	-
05	125 000	12.5	20	25	32	40	50
04	63 000	-	-	28	36	45	56
03	32 000	-	-	32	40	50	63

Table 5. Maximum loads of the VT10 hoisting trolley series.

Duty Code	Number of Full Load Lifting Cycles (k=1)	Load [t]					
		VT1022	VT1023	VT1024	VT1025	VT1026	VT1028
06	250 000	16	25	32	40	50	-
05	125 000	20	32	40	50	63	80
04	63 000	-	-	45	56	70	90
03	32 000	-	-	50	63	80	100

Table 6. Maximum loads of the VT11 hoisting trolley series.

Duty Code	Number of Full Load Lifting Cycles (k=1)	Load [t]					
		VT1122	VT1123	VT1124	VT1125	VT1126	VT1128
06	250 000	25	40	50	63	80	-
05	125 000	32	50	63	80	100	125
04	63 000	-	-	70	90	112	140
03	32 000	-	-	80	100	125	160

2.5.2 Hoisting machinery

Hoisting motor

- _Y_* = Inverter controlled Y-connected (star-connected).
- _E_* = MF22LR200. Motor used in the VT11 hoisting trolley.
- _D_* = MF18XR200N. Motor used in the VT10 hoisting trolley.
- _C_* = MF16ZR200 (In the VT9 hoisting trolley).

Hoisting gear

- _N_* = Normal speed gear for assembly duty.
- _N_* = Normal construction with one motor using the brake in the motor. Brake capacity $\geq 200\%$ compared to full load.
- _S_* = Second brake construction with another independent brake fitted directly in the gear primary shaft. Total brake capacity $\geq 400\%$.

2.6 Lifting height and hoisting design values

These tables show design values at following conditions:

- Standard ambient temperature +5...+40 °C
- Standard altitude max. 1000m
- 60 % ED (except few the VT11 models 40% ED)



Lifting calculation program is used for exact performance in different voltages (380...480 V) and ambient conditions. Lifting calculation program is calculating the exact inverter size.

Table 7. the VT9 hoisting trolley in assembly duties (duty codes: 03, 04, 05, 06), gear code: N_ (Supply voltages 400 V and 460 V).

Load [t]	Hoisting Trolley Type	Duty Code*	Lifting Cycles	Lifting Height (m)			Hoisting Speed (m/min)					
				Rail Gauge Code			400 V / 50 Hz			460 V / 60 Hz		
				24	34	42	Motor YC	ESR ¹⁾ Max	Inverter Code	Motor YC	ESR ¹⁾ Max	Inverter Code
10	VT922	06	250 000	39.8	62.3	80.3	18.5	24.1	045F	21	27.7	045F
12.5	VT922	05	125 000	39.8	62.3	80.3	14.4	24.1		16.6	27.7	
15	VT923	06	250 000	26.5	41.5	53.5	12	16		13.5	18.5	
20	VT924	06	250 000	19.9	31.2	40.2	9	12		10	13.8	
	VT923	05	125 000	26.5	41.5	53.5	9	16		10.3	18.5	
25	VT925	06	250 000	15.9	24.9	32.1	7	9.6		8	11.1	
	VT924	05	125 000	19.9	31.2	40.2	7.2	12		8.3	13.9	
28	VT924	04	63 000	19.9	31.2	40.2	6.8	12		7.8	13.8	
30	VT926	06	250 000	13.3	20.8	26.8	6	8		6.5	9.2	
32	VT924	03	32 000	19.9	31.2	40.2	6.3	12		7.2	13.8	
	VT925	05	125 000	15.9	24.9	32.1	5.6	9.6		6.5	11.1	
36	VT925	04	63 000	15.9	24.9	32.1	5.4	9.6		6.2	11.1	
40	VT925	03	32 000	15.9	24.9	32.1	5	9.6		5.7	11	
	VT926	05	125 000	13.3	20.8	26.8	4.5	8		5.2	9.2	
45	VT926	04	63 000	13.3	20.8	26.8	4.2	8		4.9	9.2	
50	VT926	03	32 000	13.3	20.8	26.8	4	8		4.6	9.2	
	VT928	05	125 000	10	15.6	20.1	3.6	6		4.2	6.9	
56	VT928	04	63 000	10	15.6	20.1	3.4	6		3.9	6.9	
63	VT928	03	32 000	10	15.6	20.1	3	6		3.5	6.9	

1) ESR speed optimized: Mentioned maximum speeds are achieved with 20 % of nominal load.

Table 8. the VT10 hoisting trolley in assembly duties (duty codes: 03, 04, 05, 06), gear code: N_ (Supply voltages 400 V and 460 V).

Load [t]	Hoisting Trolley Type	Duty Code	Lifting Cycles	Lifting Height (m)			Hoisting Speed (m/min)					
				Rail Gauge Code			400 V / 50 Hz			460 V / 60 Hz		
				24	34	42	Motor YD	ESR ¹⁾ Max	Inverter Code	Motor YD	ESR ¹⁾ Max	Inverter Code
16	VT1022	06	250 000	38.6	61.8	80.3	19.5	25	075F	22	28.7	075F
20	VT1022	05	125 000	38.6	61.8	80.3	14.4	25		16.6	31.3	
25	VT1023	06	250 000	25.7	41.2	53.6	12.5	16.6		14.3	19.1	
32	VT1024	06	250 000	19.3	30.9	40.2	9	15		10.3	17.2	
	VT1023	05	125 000	25.7	41.2	53.6	8.8	16.7		10.1	19.2	
40	VT1025	06	250 000	15.4	24.7	32.1	7	12		8	13.8	
	VT1024	05	125 000	19.3	30.9	40.2	7.2	12		8.2	13.8	
45	VT1024	04	63 000	19.3	30.9	40.2	6.8	12		7.8	13.8	
50	VT1026	06	250 000	12.9	20.6	26.8	6	10.6		6.9	12.1	
	VT1024	03	32 000	19.3	30.9	40.2	6.4	12		7.3	13.8	
	VT1025	05	125 000	15.4	24.7	32.1	5.6	9.6		6.4	11	
56	VT1025	04	63 000	15.4	24.7	32.1	5.4	9.6		6.1	11	
63	VT1025	03	32 000	15.4	24.7	32.1	5	9.6		5.7	11	
	VT1026	05	125 000	12.9	20.6	26.8	4.5	7.7		5.1	8.8	
70	VT1026	04	63 000	12.9	20.6	26.8	4.2	7.7		4.8	8.8	
80	VT1026	03	32 000	12.9	20.6	26.8	4	8.2		4.6	9.5	
	VT1028	05	125 000	9.7	15.4	20.1	3.6	6.1		4.1	6.9	
90	VT1028	04	63 000	9.7	15.4	20.1	3.4	6.1		3.8	6.9	
100	VT1028	03	32 000	9.7	15.4	20.1	3.2	6.1		3.6	6.9	

1) ESR speed optimized: Mentioned maximum speeds are achieved with 20 % of nominal load.

Table 9. the VT11 hoisting trolley in assembly duties (duty codes: 03, 04, 05, 06), gear code: N_ (Supply voltages 400 V and 460 V).

Load [t]	Hoisting Trolley Type	Duty Code	Lifting Cycles	Lifting Height (m)				Hoisting Speed (m/min)					
				Rail Gauge Code				400 V / 50 Hz			460 V / 60 Hz		
				27	34	42	53	Motor YE	ESR ¹⁾ Max	Inverter Code	Motor YE	ESR ¹⁾ Max	Inverter Code
25	VT1122	06	250 000	42.6	59	77.8	104	20	25.1	090F	23	28.9	090F
32	VT1122	05	125 000	42.6	59	77.8	104	14.4	25.1		16.6	28.9	
40	VT1123	06	250 000	28.4	39.4	51.8	69	12.8	16.7		14.7	19.2	
50	VT1123	05	125 000	28.4	39.4	51.8	69	9	16.7		10.3	19.3	
	VT1124	06	250 000	21.3	29.5	38.9	51.8	9	15		10.3	17.2	
63	VT1124	05	125 000	21.3	29.5	38.9	51.8	7.2	12		8.2	13.8	
	VT1125	06	250 000	17	23.6	31.1	41.4	7	12		8	13.8	
70	VT1124	04	63 000	21.3	29.4	38.9	51.8	6.8	12		7.8	13.8	
80	VT1126	06	250 000	14.2	19.7	25.9	34.5	6.3	8.3		7.3	9.6	
	VT1124	03	32 000	21.3	29.5	38.9	51.8	6.4	12		7.3	13.8	
	VT1125	05	125 000	17	23.6	31.1	41.4	5.6	9.6		6.4	11	
90	VT1125	04	63 000	17	23.6	31.1	41.4	5.3	9.6		6.1	11	
100	VT1125	03	32 000	17	23.6	31.1	41.4	5	9.6		5.7	11	
	VT1126	05	125 000	14.2	19.7	25.9	34.4	4.4	7.6		5.1	8.8	
112	VT1126	04	63 000	14.2	19.7	25.9	34.4	4.2	7.6		4.8	8.8	
125 ²⁾	VT1126	03	32 000	14.2	19.7	25.9	34.4	4	8.3		4.6	9.6	
125	VT1128	05	125 000	10.6	14.8	19.4	25.9	3.6	6		4.1	6.9	
140	VT1128	04	63 000	10.6	14.8	19.4	25.9	3.3	6		3.8	6.9	
160 ²⁾	VT1128	03	32 000	10.6	14.8	19.4	25.9	3.2	6.2		3.6	6.9	

1) ESR speed optimized: Mentioned maximum speeds are achieved with 20 % of nominal load.
2) 40 % ED.

2.7 Travelling machinery

Hoisting trolley is equipped with two travelling machineries.

Travelling motor

- Y_* = Inverter controlled motor, Y-connected (star-connected)
- D_* = Inverter controlled motor, D-connected (delta-connected)
- _1* = MF07XA200
- _2* = MF10ZM200
- _3* = MF11XM200
- _0* = Fixed trolley, no travelling machinery

Travelling gear

- L_* = Medium speed gear (VES)
- N_* = Normal speed gear (QM06 and VES)
- M_* = Medium speed gear (QM06 and VES)
- H_* = High speed gear (QM06 and VES)
- U_* = Medium speed gear (QM07)
- T_* = High speed gear (QM07)
- V_* = High speed gear (QM07)
- _G* = VES series gear
- _Q* = QM series gear (QM06 and QM07)
- _0* = Fixed trolley, no travelling machinery

Rail wheel

_0 = Normal construction with high grade spheroidal cast iron (EN-GJS700). Good tribology mating S 355 rail. For optimum surface pressure convex rail wheel surface is used. Travelling machinery from VES possible.

_1 = Construction with hardened steel. QM series travelling machinery. Highest loaded hoisting trolley standard feature. Optional for hoisting trolleys where normally cast rail wheel is used.

F_ = Fixed trolley, no wheels

_6 = Guiding rail wheels in hoisting gear end of hoisting trolley grooved 66 mm for flat rail 60. The other end carriage has flangeless rail wheels.

_8 = Rail wheels in hoisting gear end of hoisting trolley grooved 86 mm for flat rail 80.

_C = Rail wheels in hoisting gear end of hoisting trolley grooved 106 mm for flat rail 100.

_D = Rail wheel in hoisting gear end of hoisting trolley grooved 126 mm for flat rail 120.

_0 = All rail wheels flangeless. Guide rollers fitted instead of flanges. Needed when rail is bigger than usual. Needed with special (not flat) rails and with VT9 and VT10 when those are at the same rail with VT11 or VT12. Max rail width with guide rollers is 120mm

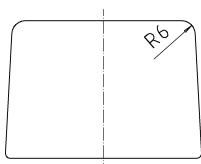
_X = Fixed trolley, no wheels

Using flangeless wheels in one of the end carriages and double flanged wheels in the other end carriage produces low side forces. The low side forces will reduce wearing on the wheels.

Rail construction

To ensure a safe and trouble free operation of the hoisting trolley, the rail has to be equipped with approximately radius 6mm on its running surface according to the figure.

Figure 2. Rail construction.



2.7.1 Travelling speed data

These tables show travelling speed data at following conditions:

- Standard ambient temperature +5...+40 °C
- Standard altitude max. 1000m
- 60 % ED
- VT9 and VT10 with 4 wheels, VT11 with 4 or 6 wheels
- One end carriage with flangeless wheels, other end carriage with flanges, or both wheels without flanges.



Drive calculation program is used for exact performance and gear ratio selection in different voltages (380...480 V) and ambient conditions. The travelling speeds depend on the power supply voltage. The acceleration times are according to drive calculation program.

Table 10. VT9 hoisting trolley in assembly duties 400 V.

Load [t]	Hoisting Trolley Type	Duty Code	Travelling Cycles	Rail Wheel Diameter [mm]	Rail Width S355 [mm]	Speed ¹⁾ (m/min)					
						13	16	20	26	32	40
10	VT922	06	250 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q6	G5,Q9
12.5	VT922	05	125 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q6	G5,Q9
15	VT923	06	250 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q6	G5,Q9
20	VT923	05	125 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q6	G5,Q9
	VT924	06	250 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q6	G5,Q9
25	VT924	05	125 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q6	G5,Q9
	VT925	06	250 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q13
28	VT924	04	63 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q6	Q9
30	VT926	06	250 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
32	VT924	03	32 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
	VT925	05	125 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
36	VT925	04	63 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q13
40	VT925	03	32 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q13
	VT926	05	125 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q13
45	VT926	04	63 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q10
50	VT926	03	32 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	Q9	Q10
50	VT928	05	125 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	Q9	Q10
56	VT928	04	63 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q9	Q9	Q10
63	VT928	03	32 000	250	80	G4,Q6	G4,Q6	G4,Q6	G2,Q9	Q9	Q10

1) See Table 16 for travelling machinery configurations.

Table 11. VT9 hoisting trolley in assembly duties 460 V.

Load [t]	Hoisting Trolley Type	Duty Code	Travelling Cycles	Rail Wheel Diameter [mm]	Rail Width S355 [mm]	Speed ¹⁾ (m/min)					
						15	18.5	23	29.5	37	46
10	VT922	06	250 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
12.5	VT922	05	125 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
15	VT923	06	250 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
20	VT923	05	125 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
	VT924	06	250 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q13
25	VT924	05	125 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
	VT925	06	250 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q13
28	VT924	04	63 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
30	VT926	06	250 000	250	80	G4,Q6	G4,Q6	G4,Q6	G2,Q6	G3,Q9	Q9
32	VT924	03	32 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
	VT925	05	125 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
36	VT925	04	63 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
40	VT925	03	32 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
	VT926	05	125 000	250	80	G4,Q6	G4,Q6	G4,Q6	G2,Q6	G3,Q9	Q9
45	VT926	04	63 000	250	80	G4,Q6	G4,Q6	G4,Q6	G2,Q6	Q9	Q13
50	VT926	03	32 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	Q9	Q13
50	VT928	05	125 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q9	Q9	Q10
56	VT928	04	63 000	250	80	G4,Q6	G4,Q6	G4,Q6	G2,Q9	Q9	Q13
63	VT928	03	32 000	250	80	G4,Q6	G4,Q6	Q6	Q9	Q9	Q13

1) See Table 16 for travelling machinery configurations.

Table 12. VT10 hoisting trolley 400 V, 50Hz, Rail widths might change, table with worst case values

Load [t]	Hoisting Trolley Type	Duty Code	Travelling Cycles	Rail Wheel Diameter [mm]	Rail Width S355 [mm]	Speed ¹⁾ (m/min)					
						13	16	20	26	32	40
16	VT1022	06	250 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q6	G5,Q9
20	VT1022	05	125 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q6	G5,Q9
25	VT1023	06	250 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q6	Q13
32	VT1023	05	125 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
	VT1024	06	250 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q9
40	VT1025	06	250 000	315	60	Q6	Q6	Q6	Q9	Q9	Q9
	VT1024	05	125 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q13
45	VT1024	04	63 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	Q10
50	VT1026	06	250 000	315	80	Q6	Q6	Q6	Q9	Q8	Q9
	VT1025	05	125 000	315	80	Q6	Q6	Q6	Q6	Q9	Q9
	VT1024	03	32 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q6	Q9	Q10
56	VT1025	04	63 000	315	80	Q6	Q6	Q6	Q9	Q9	Q9
63	VT1026	05	125 000	315	80	Q6	Q6	Q6	Q9	Q8	Q9
	VT1025	03	32 000	315	80	Q6	Q6	Q6	Q9	Q8	Q9
70	VT1026	04	63 000	315	80	Q6	Q6	Q6	Q9	Q8	Q8
75	VT1026	03	32 000	315	80	Q6	Q6	Q6	Q9	Q8	Q8
80	VT1028	05	125 000	315	100	Q6	Q6	Q6	Q6	Q9	Q8
90	VT1028	04	63 000	315	100	Q6	Q6	Q6	Q8	Q9	-
100	VT1028	03	32 000	315	100	Q6	Q6	Q6	Q8	-	-

1) See Table 16 for travelling machinery configurations.

Table 13. VT10 hoisting trolley 460 V, 60Hz. Rail widths might change, table with worst case values

Load [t]	Hoisting Trolley Type	Duty Code	Travelling Cycles	Rail Wheel Diameter [mm]	Rail Width S355 [mm]	Speed ¹⁾ (m/min)					
						15	18.5	23	29.5	37	46
16	VT1022	06	250 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q6	G3,Q9	G5,Q9
20	VT1022	05	125 000	250	60	G4,Q6	G4,Q6	G4,Q6	G1,Q16	G3,Q9	G5,Q9
25	VT1023	06	250 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q16	G3,Q9	Q13
32	VT1023	05	125 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q16	G3,Q9	Q9
	VT1024	06	250 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q16	G3,Q9	Q10
40	VT1025	06	250 000	315	60	Q6	Q6	Q6	Q24	Q9	Q9
	VT1024	05	125 000	250	80	G4,Q6	G4,Q6	G4,Q6	G4,Q6	G5,Q9	Q9
45	VT1024	04	63 000	250	80	G4,Q6	G4,Q6	G4,Q6	G4,Q6	Q9	Q13
50	VT1026	06	250 000	315	80	Q6	Q6	Q6	Q9	Q9	Q11
	VT1025	05	125 000	315	80	Q6	Q6	Q6	Q6	Q9	Q9
	VT1024	03	32 000	250	80	G4,Q6	G4,Q6	G4,Q6	G1,Q9	Q9	Q10
56	VT1025	04	63 000	315	80	Q6	Q6	Q6	Q9	Q9	Q9
63	VT1026	05	125 000	315	80	Q6	Q6	Q6	Q9	Q9	Q10
	VT1025	03	32 000	315	80	Q6	Q6	Q6	Q9	Q9	Q9
70	VT1026	04	63 000	315	80	Q6	Q6	Q6	Q9	Q8	Q11
75	VT1026	03	32 000	315	80	Q6	Q6	Q6	Q9	Q8	Q11
80	VT1028	05	125 000	315	100	Q6	Q6	Q6	Q9	Q8	-
90	VT1028	04	63 000	315	100	Q6	Q6	Q6	Q8	-	-
100	VT1028	03	32 000	315	100	Q6	Q6	Q6	-	-	-

1) See Table 16 for travelling machinery configurations.

Table 14. VT11 hoisting trolley 400 V, 50Hz. Rail widths might change, table with worst case values

Load [t]	Hoisting Trolley Type	Duty Code	Travelling Cycles	Amount of Rail Wheels [pcs]	Rail Wheel Diameter [mm]	Rail Width S355 [mm]	Speed ¹⁾ (m/min)					
							13	16	20	26	32	40
25	VT1122	06	250 000	4	315	60	Q6	Q6	Q6	Q6	Q6	Q9
32	VT1122	05	125 000	4	315	60	Q6	Q6	Q6	Q6	Q6	Q9
40	VT1123	06	250 000	4	315	60	Q6	Q6	Q6	Q6	Q9	Q9
50	VT1123	05	125 000	4	315	80	Q6	Q6	Q6	Q6	Q9	Q9
	VT1124	06	250 000	4	315	80	Q6	Q6	Q6	Q9	Q8	Q8
63	VT1124	05	125 000	4	315	80	Q6	Q6	Q6	Q9	Q8	Q8
	VT1125	06	250 000	4	315	80	Q6	Q6	Q6	Q6	Q9	-
100						-	-	-	-	-	Q20	
70	VT1124	04	63 000	4	315	80	Q6	Q6	Q6	Q9	Q8	Q8
80	VT1126	06	250 000	6	315	80	Q6	Q6	Q6	Q8	Q9	Q20
	VT1125	05	125 000	4	315	100	Q6	Q6	Q6	Q6	Q9	Q8
	VT1124	03	32 000	4	315	80	Q6	Q6	Q6	Q6	Q9	-
100						-	-	-	-	-	Q8	
90	VT1125	04	63 000	4	315	100	Q6	Q6	Q6	Q8	Q9	Q20
100	VT1125	03	32 000	4	315	100	Q6	Q6	Q6	Q18	Q19	Q22
	VT1126	05	125 000	6	315	80	Q6	Q6	Q7	Q14	Q19	Q22
	VT1126	05	125 000	6	315	100					Q19	Q22
112	VT1126	04	63 000	6	315	80	Q6	Q6	Q7	Q18	Q19	Q22
125	VT1126	03	32 000	6	315	80	Q6	Q6	Q14	Q18	-	-
						100	-	-	-	-	Q19	Q22
125	VT1128	05	125 000	6	315	100	Q6	Q6	Q14	Q18	Q19	Q22
140	VT1128	04	63 000	6	315	100	Q14	Q14	Q19	Q19	Q20	Q23
160	VT1128	03	32 000	6	315	100	Q14	Q14	Q19	Q19	Q20	Q23

1) See Table 16 for travelling machinery configurations.

Table 15. VT11 hoisting trolley 460 V, 60Hz. Rail widths might change, table with worst case values

Load [t]	Hoisting Trolley Type	Duty Code	Travelling Cycles	Amount of Rail Wheels [pcs]	Rail Wheel Diameter [mm]	Rail Width S355 [mm]	Speed ¹⁾ (m/min)					
							15	18.5	23	29.5	37	46
25	VT1122	06	250 000	4	315	60	Q6	Q6	Q6	Q6	Q9	Q9
32	VT1122	05	125 000	4	315	60	Q6	Q6	Q6	Q6	Q6	Q9
40	VT1123	06	250 000	4	315	60	Q6	Q6	Q6	Q9	Q9	Q9
50	VT1123	05	125 000	4	315	80	Q6	Q6	Q6	Q9	Q8	Q10
	VT1124	06	250 000	4	315	80	Q6	Q6	Q6	Q9	Q8	Q11
63	VT1124	05	125 000	4	315	80	Q6	Q6	Q6	Q9	Q9	Q10
	VT1125	06	250 000	4	315	80	Q6	Q6	Q6	Q7	Q9	-
						100	-	-	-	-	-	Q20
70	VT1124	04	63 000	4	315	80	Q6	Q6	Q6	Q9	Q8	Q11
80	VT1126	06	250 000	6	315	80	Q6	Q6	Q6	Q14	Q19	Q22
	VT1125	05	125 000	4	315	100	Q6	Q6	Q6	Q9	Q8	Q19
	VT1124	03	32 000	4	315	80	Q6	Q6	Q6	Q9	Q8	-
						100	-	-	-	-	-	Q19
90	VT1125	04	63 000	4	315	100	Q6	Q6	Q6	Q18	Q19	Q19
100	VT1125	03	32 000	4	315	100	Q6	Q6	Q6	Q18	Q19	Q22
	VT1126	05	125 000	6	315	80	Q6	Q6	Q6	Q14	-	-
	VT1126	05	125 000	6	315	100	-	-	-	-	Q19	Q22
112	VT1126	04	63 000	6	315	80	Q6	Q6	Q14	Q18	Q19	Q22
125	VT1126	03	32 000	6	315	80	Q6	Q14	Q14	-	-	-
						100	-	-	-	Q18	Q20	Q22
125	VT1128	05	125 000	6	315	100	Q6	Q14	Q14	Q19	Q20	Q23
140	VT1128	04	63 000	6	315	100	Q17	Q18	Q18	Q19	Q20	Q23
160	VT1128	03	32 000	6	315	100	Q17	Q19	Q19	Q20	Q21	Q23

1) See Table 16 for travelling machinery configurations.

Table 16. Travelling machinery configurations.

Code	Motor	Gear ratio	Machinery	Rail Wheel	Inverter code
G1	Y1	N_(87)	_G	0_ (cast rail wheel)	005F
G2	Y1	M_(71)	_G	0_ (cast rail wheel)	005F
G3	Y1	M_(71)	_G	0_ (cast rail wheel)	007F
G4	Y1	H_(114)	_G	0_ (cast rail wheel)	005F
G5	Y1	L_(54)	_G	0_ (cast rail wheel)	005F
Q6	Y2	N_(90)	_Q(QM6)	1_ (hardened rail wheel)	007F
Q7	Y2	N_(90)	_Q(QM6)	1_ (hardened rail wheel)	011F
Q8	D2	N_(90)	_Q(QM6)	1_ (hardened rail wheel)	015F
Q9	Y2	M_(45)	_Q(QM6)	1_ (hardened rail wheel)	011F
Q10	D2	M_(45)	_Q(QM6)	1_ (hardened rail wheel)	015F
Q11	D2	M_(45)	_Q(QM6)	1_ (hardened rail wheel)	018F
Q13	Y2	H_(22)	_Q(QM6)	1_ (hardened rail wheel)	011F
Q14	Y3	V_(112)	_Q(QM7)	1_ (hardened rail wheel)	011F
Q16	Y3	V_(112)	_Q(QM7)	1_ (hardened rail wheel)	018F
Q17	D3	V_(112)	_Q(QM7)	1_ (hardened rail wheel)	018F
Q18	Y3	U_(56)	_Q(QM7)	1_ (hardened rail wheel)	011F
Q19	Y3	U_(56)	_Q(QM7)	1_ (hardened rail wheel)	015F
Q20	Y3	U_(56)	_Q(QM7)	1_ (hardened rail wheel)	018F
Q21	Y3	U_(56)	_Q(QM7)	1_ (hardened rail wheel)	022F
Q22	D3	U_(56)	_Q(QM7)	1_ (hardened rail wheel)	022F
Q23	D3	U_(56)	_Q(QM7)	1_ (hardened rail wheel)	030F
Q24	Y3	T_(28)	_Q(QM7)	1_ (hardened rail wheel)	015F

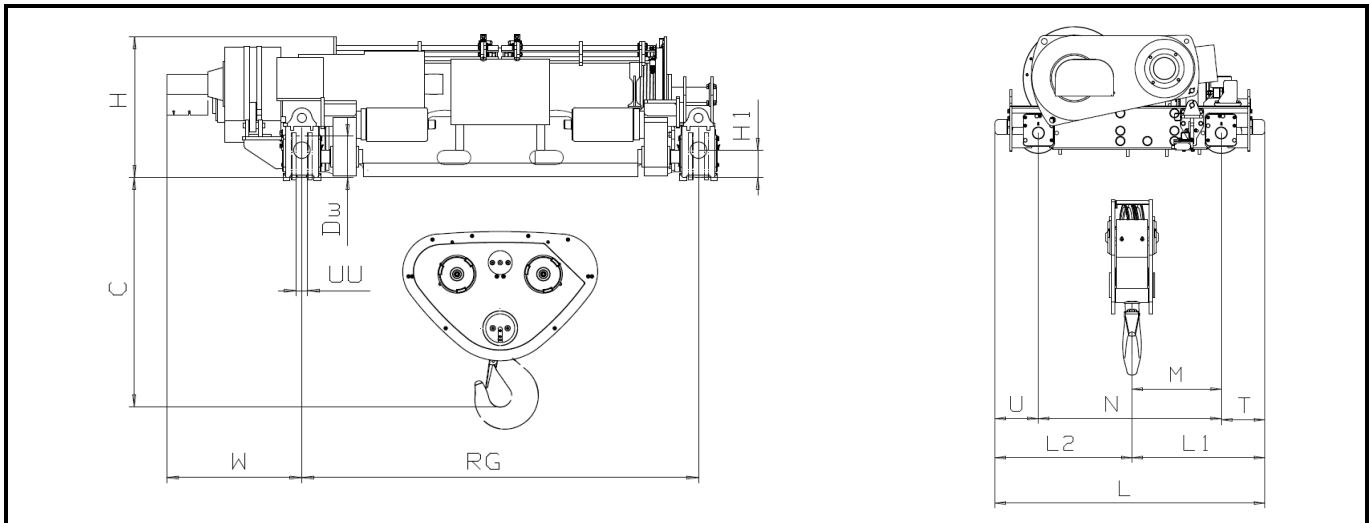
2.8 Dimensional tables

2.8.1 Hoisting trolley

Table 17. VT9 hoisting trolley dimensions.

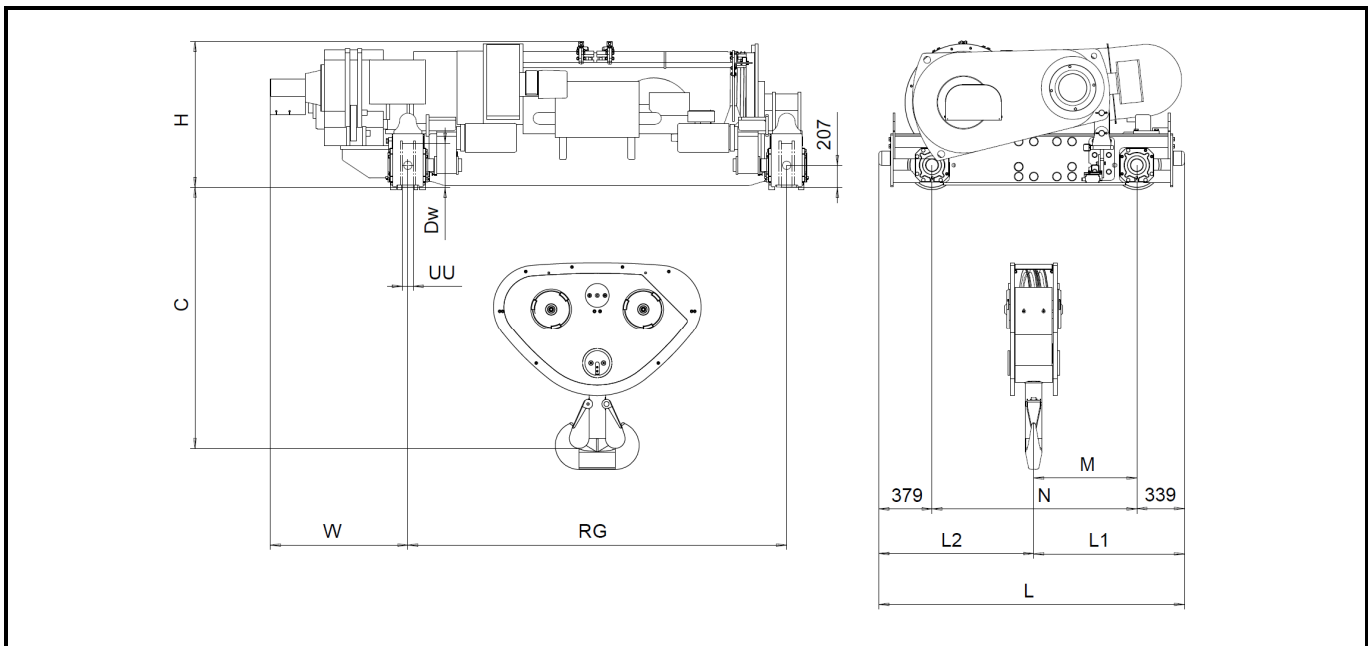
Hoisting Trolley Type	Hoisting Trolley Dimensions [mm]									Rail Wheel [mm]		C [mm]			Weight (kg)		
	H	M	N	L	L1	L2	T	U	W	D _w	UU	Rail Gauge Code			Rail Gauge Code		
												24	34	42	24	34	42
VT922	729	579	1050	1642	875	767	296	296	705	250	86	1260	1165	1165	4170	4730	5170
VT923	729	529	1050	1642	825	817	296	296	705	250	86	1230	1045	1165	4200	4760	5200
VT924	729	532	1050	1642	828	814	296	296	705	250	86	1230	1045	1045	4200	4770	5200
VT925	729	513	1050	1642	809	833	296	296	705	250	86	1315	1130	1130	4330	4890	5320
VT926	729	483	1050	1642	779	863	296	296	705	250	86	1315	1130	1130	4320	4890	5320
VT928	729	452	1050	1642	748	894	296	296	705	250	86	1440	1255	1255	4530	5090	5530

Table 18. VT10 hoisting trolley dimensions.



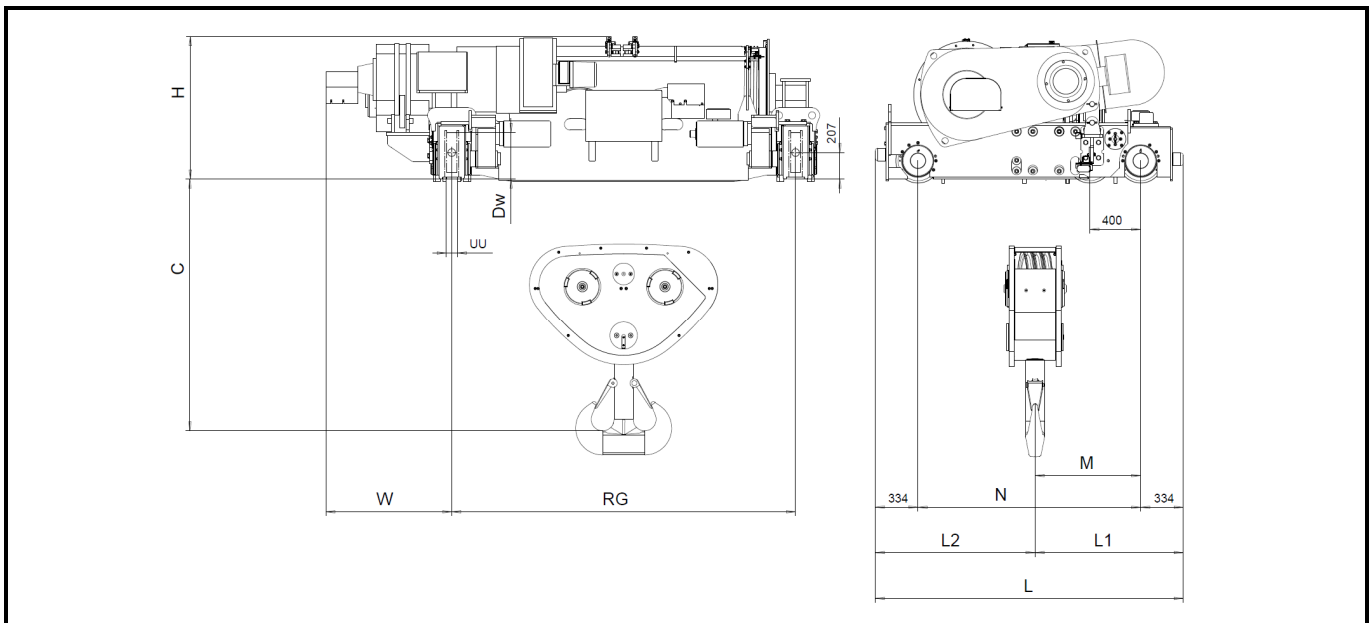
Hoisting Trolley Type	Hoisting Trolley Dimensions										Rail Wheel		C [mm]			Weight (kg)		
	[mm]										[mm]		Rail Gauge Code			Rail Gauge Code		
	H	H1	M	N	L	L1	L2	T	U	W	D _w	UU	24	34	42	24	34	42
VT1022	851	165	625	1250	1842	921	921	296	296	790	250	86	1435	1345	1345	4850	5400	5850
VT1023	851	165	625	1250	1842	921	921	296	296	790	250	86	1405	1225	1345	4850	5450	5850
VT1024	851	165	610	1250	1842	906	936	296	296	790	250	86	1405	1225	1225	4850	5450	5850
VT1025	923	207	595	1250	1917	929	989	334	334	790	315	106	1520	1340	1340	5300	5850	6300
VT1026	923	207	575	1250	1917	909	1009	334	334	790	315	106	1520	1340	1340	5300	5850	6300
VT1028	923	207	540	1250	1917	874	1044	334	334	790	315	106	1586	1406	1406	5500	6050	6500

Table 19. VT11 four wheel hoisting trolley dimensions.



Hoisting Trolley Type	Hoisting Trolley Dimensions [mm]							Rail Wheel [mm]		C [mm]				Weight (kg)			
	H	M	N	L	L1	L2	W	D _w	UU	Rail Gauge Code				Rail Gauge Code			
										27	34	42	53	27	34	42	53
VT1122	1045	795	1460	2178	1134	1044	896	315	106	1895	1595	1595	1745	7160	8060	8835	10685
VT1123	1045	775	1460	2178	1114	1064	896	315	106	1900	1535	1595	1595	7170	8170	8980	10845
VT1124	1045	735	1460	2178	1074	1104	896	315	106	1865	1475	1475	1595	7475	8375	9195	11050
VT1125	1045	725	1460	2178	1064	1114	896	315	106	1980	1600	1600	1600	7715	8715	9540	11400

Table 20. VT11 six wheel hoisting trolley dimensions.



Hoisting Trolley Type	Hoisting Trolley Dimensions [mm]							Rail Wheel [mm]		C [mm]				Weight (kg)			
	H	M	N	L	L1	L2	W	D _w	U _U	Rail Gauge Code				Rail Gauge Code			
										27	34	42	53	27	34	42	53
VT1126	1113	830	1750	2417	1164	1254	896	315	106	1980	1650	1650	1650	9720	10120	11155	13190
VT1128	1113	792	1750	2417	1126	1292	896	315	106	2065	1730	1730	1730	10305	10705	11730	13775

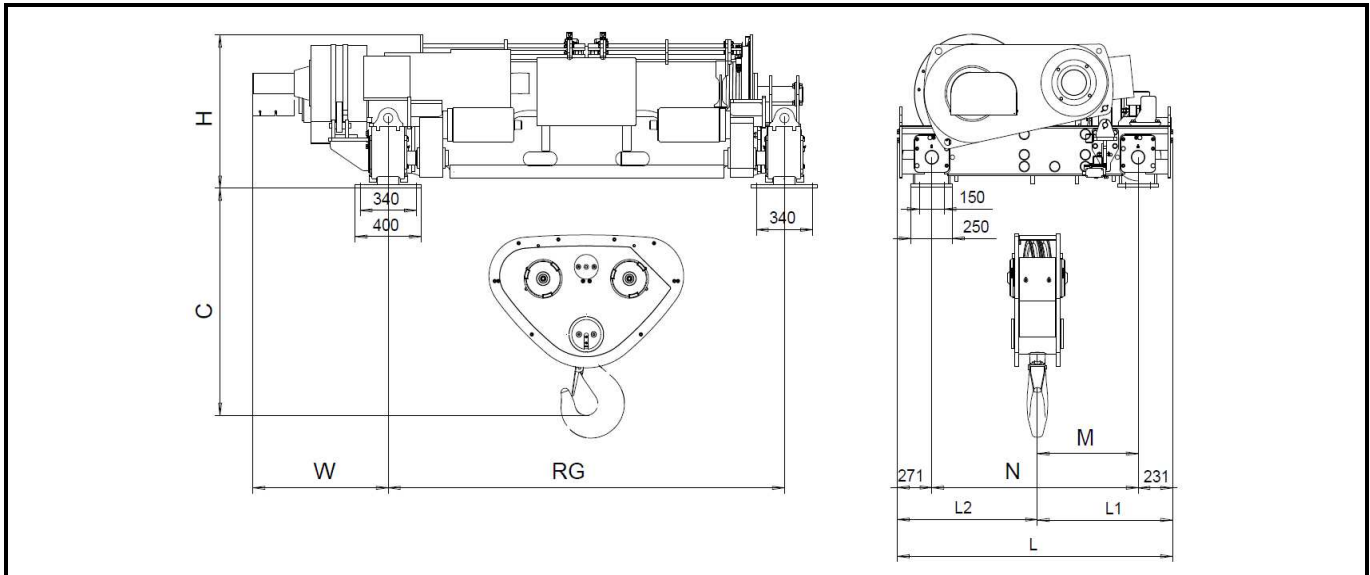
2.8.2 Service platform

Table 21. Optional service platform.

Hoisting Trolley Type	Hoisting Trolley Dimensions [mm]								Weight (kg)				
	S	SH	H	(Width) W					Rail Gauge code				
				24	27	34	42	53	24	27	34	42	53
VT922...28	691	784	372	74	373	348	728	691	249	-	314	360	-
VT1022...24	691	283	851	2130	-	3130	3930	-	268	-	344	398	-
VT1025...28	707	277	923	2130	-	3130	3930	-	268	-	344	398	-
VT1122...25	880	201	1045	-	2235	2935	3735	4835	-	239	301	351	478
VT1126...28	820	200	1113	-	2235	2935	3735	4835	-	239	301	351	478

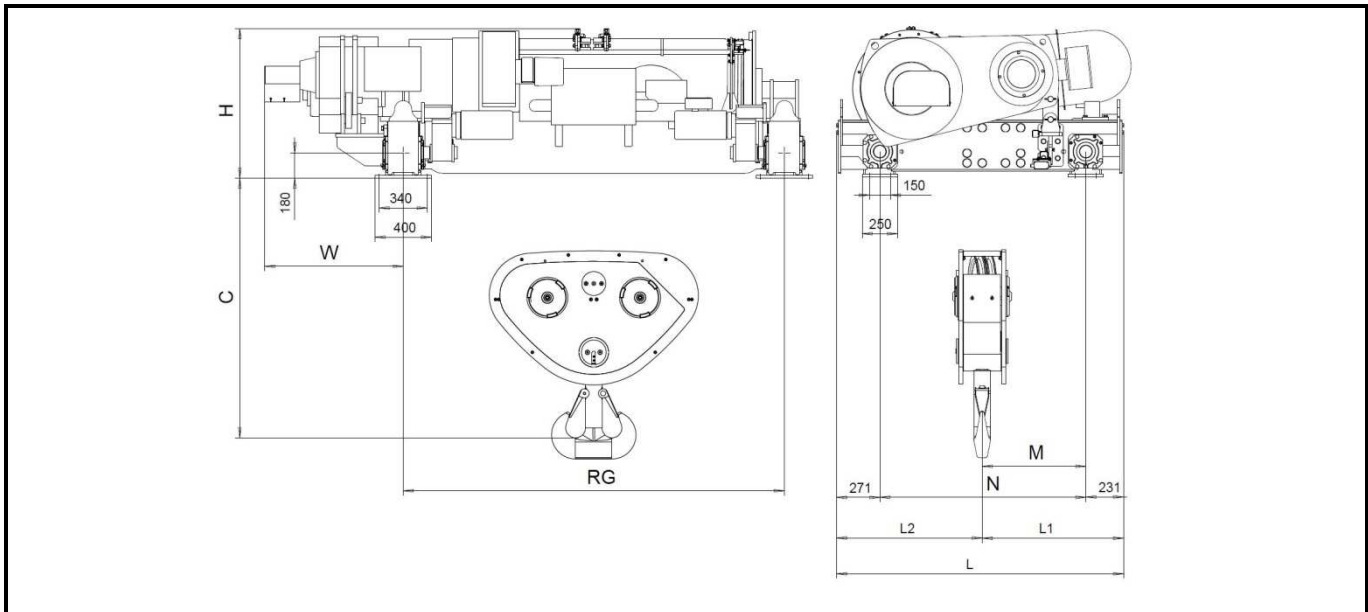
2.8.3 Fixed hoisting trolley

Table 22. VT10 fixed hoisting trolley dimensions.



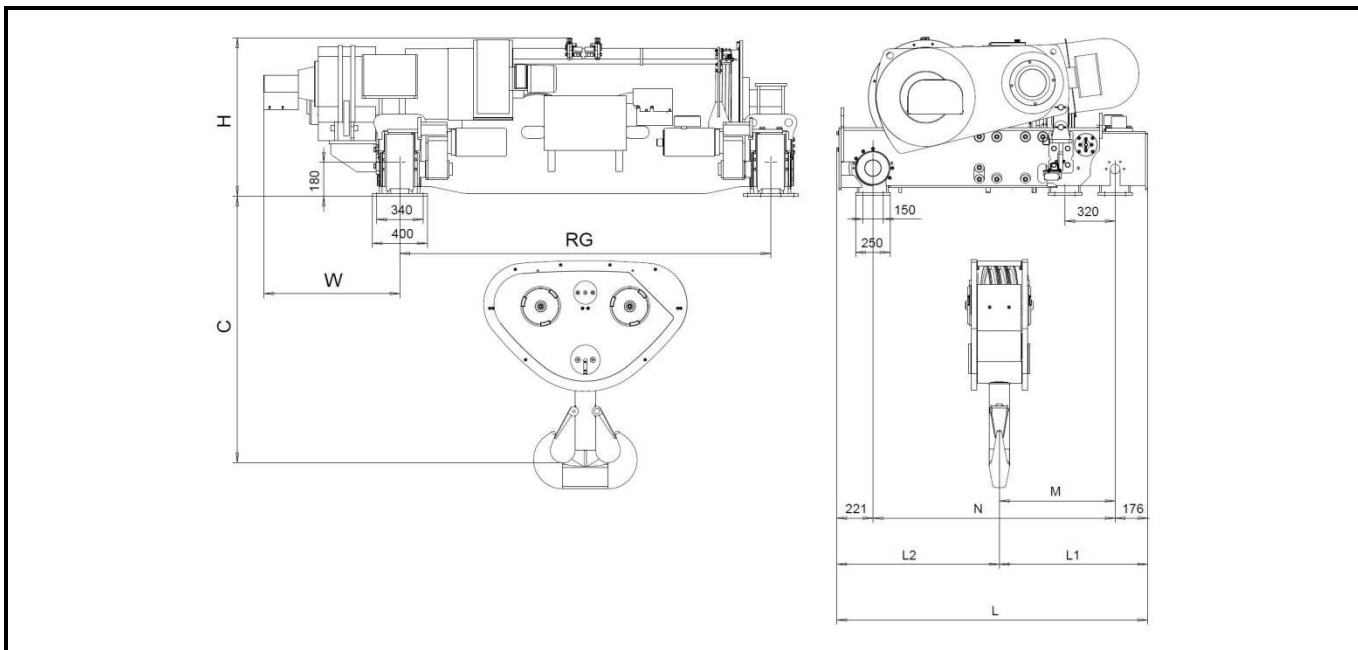
Hoisting Trolley Type	Hoisting Trolley Dimensions									C [mm]			Weight (kg)		
	[mm]									Rail Gauge Code			Rail Gauge Code		
	H	M	N	L	L1	L2	T	U	W	24	34	42	24	34	42
VT1022	906	625	1250	1666	833	833	208	208	790	1370	1335	1335	4850	5400	5850
VT1023	906	625	1250	1666	833	833	208	208	790	1340	1215	1335	4850	5450	5850
VT1024	906	610	1250	1666	848	848	208	208	790	1340	1160	1160	4850	5450	5850
VT1025	946	595	1250	1700	820	880	225	225	790	1497	1317	1317	5200	5750	6200
VT1026	946	575	1250	1700	800	900	225	225	790	1497	1317	1317	5200	5750	6200
VT1028	946	540	1250	1700	765	935	225	225	790	1563	1383	1383	5400	5950	6400

Table 23. VT11 four wheel fixed hoisting trolley dimensions.



Hoisting Trolley Type	Hoisting Trolley Dimensions [mm]							C [mm]				Weight (kg)			
	H	M	N	L	L1	L2	W	Rail Gauge Code				Rail Gauge Code			
								27	34	42	53	27	34	42	53
VT1122	1067	795	1460	1962	1026	936	896	1873	1563	1563	1713	6600	7500	8750	9700
VT1123	1067	775	1460	1962	1006	956	896	1843	1443	1563	1563	6700	7700	8750	9900
VT1124	1067	735	1460	1962	966	996	896	1843	1443	1443	1563	6900	7800	8950	10000
VT1125	1067	725	1460	1962	956	1006	896	1908	1508	1508	1508	7200	8200	9350	10400

Table 24. VT11 six wheel fixed hoisting trolley dimensions.



Hoisting Trolley Type	Hoisting Trolley Dimensions [mm]							C [mm]				Weight (kg)			
	H	M	N	L	L1	L2	W	Rail Gauge Code				Rail Gauge Code			
								27	34	42	53	27	34	42	53
VT1126	1113	830	1750	2417	1164	1254	896	1980	1635	1635	1635	9600	10000	10300	10700
VT1128	1113	792	1750	2417	1126	1292	896	2065	1720	1720	1720	10200	10600	10900	11300

2.8.4 Hook block

Figure 3. Hook blocks used in hoisting trolleys.

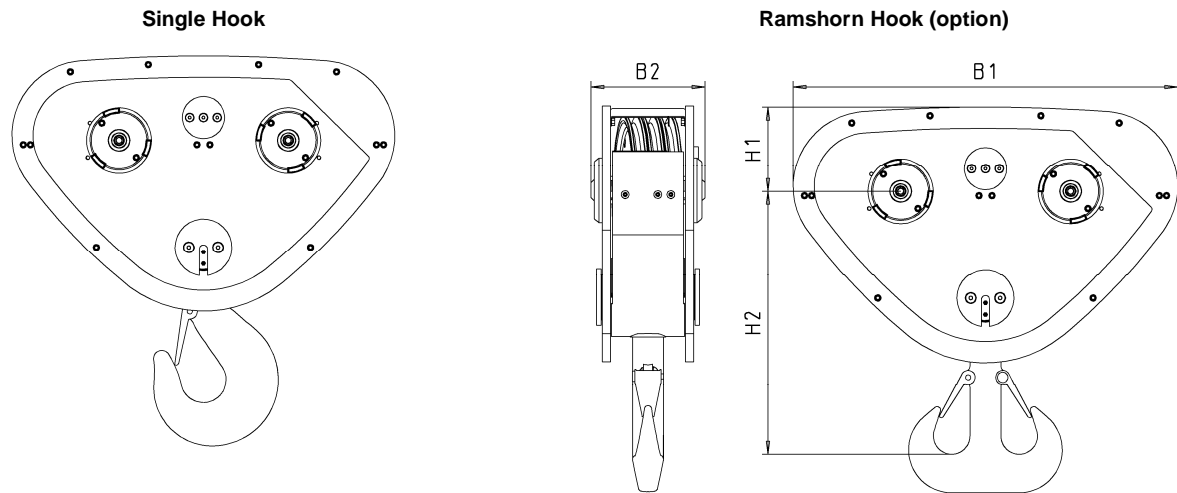


Table 25. Dimensions of hook blocks.

Hoisting Trolley Type	DIN Forging NR	Hook Block Dimensions [mm]					Weight (kg)	
	T	Rope pulley Ø	H1	H2	B1	B2	Single	Ramshorn
VT922	10	336	220	663	960	310	342	334
VT923	10	336	220	663	960	310	360	352
VT924	10	336	220	663	960	310	371	363
VT925	16	336	220	752	960	360	473	455
VT926	16	336	220	752	960	360	482	465
VT928	25	336	220	879	960	415	764	636
VT1022	16	420	250	808	1160	360	554	536
VT1023	16	420	250	808	1160	360	580	562
VT1024	16	420	250	808	1160	360	613	595
VT1025	25	420	250	935	1160	415	825	787
VT1026	25	420	250	935	1160	415	856	818
VT1028	32	420	250	1001	1160	490	1167	1122
VT1122	25	540	320	995	1440	415	1004	939
VT1123	25	540	320	995	1440	415	1042	1001
VT1124	25	540	320	995	1440	415	1126	1060
VT1125	32	540	320	1061	1440	490	1480	1435
VT1126	40	540	320	1139	1440	490	1724	1593
VT1128	50	540	320	1223	1440	562	2195	2111

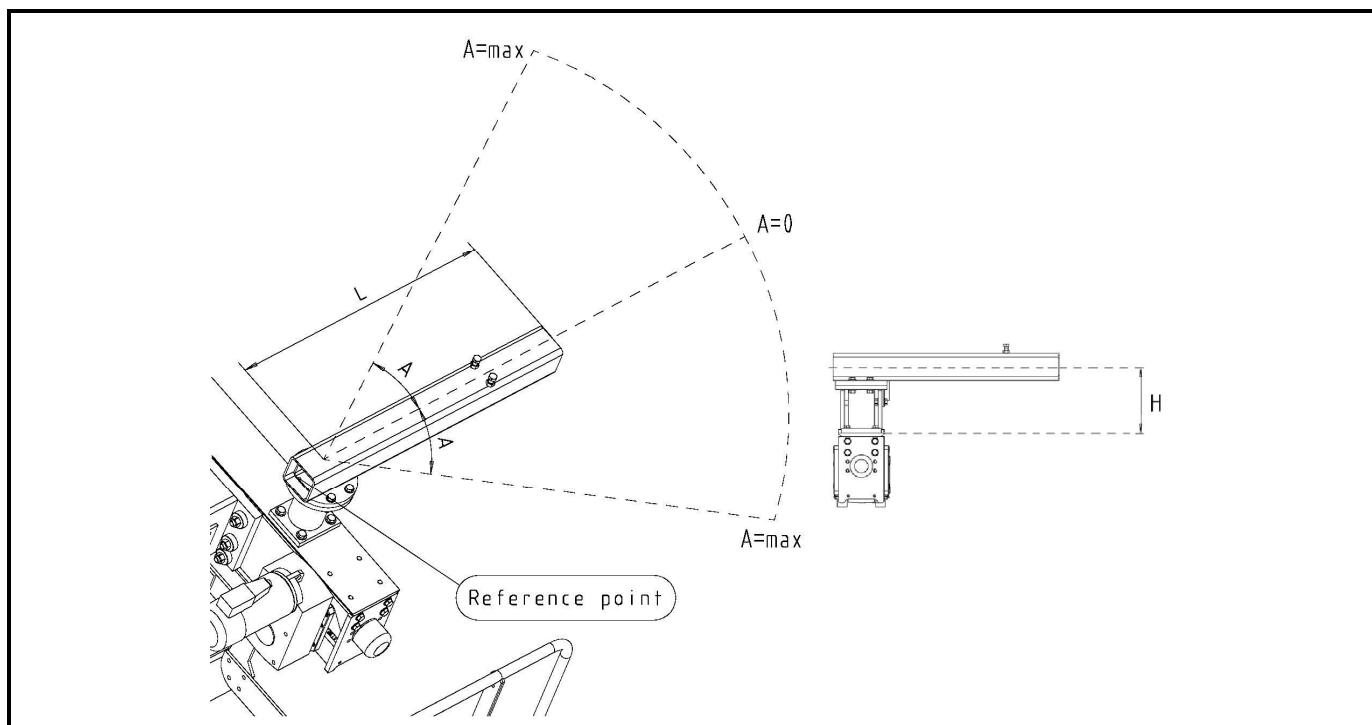
The available Ramshorn forging as well as the forging rotation locking unit (90° intervals) do not change the hook block dimensions.

2.8.5 Hoisting trolley towing arm and cable lengths

Towing arm

The towing arm mounted on the hoisting trolley allows adjustment of the angle to provide compatibility with all girders and festoon configurations. See following table for more detailed information.

Figure 4. Dimensional values of towing arm.



Towing Arm Dimensions						
L [mm]	H [mm]		A [°]		Towing arm tube [mm]	
	D250 wheel	D315 wheel	min	max	Outer dimension	Inner dimension
865	295	430	- 37.5	+ 37.5	120 x 120	106 x 106

Cable length

The motor cables from festoon run directly to the motors, the other cables run in the cubicle. The additional lengths for cables from the reference point shown above to the motor terminal boxes and the cubicle are chosen from following table. The hoisting trolley towing arm locates in the non hoisting machinery side of the hoisting trolley.

Table 26. Additional cable lengths approximately.

Hoisting Trolley Type	Cable Lengths (m)																			
	Rail Gauge Code																			
	24				27				34				42				53			
	Hoisting Motor	Travelling Motors		Cubicle	Hoisting Motor	Travelling Motors		Cubicle	Hoisting Motor	Travelling Motors		Cubicle	Hoisting Motor	Travelling Motors		Cubicle	Hoisting Motor	Travelling Motors		Cubicle
VT9	3.5	0.75	3.1	2.8	-	-	-	-	4.5	0.75	4.1	2.8	5.3	0.75	4.9	2.8	-	-	-	-
VT10	3.6	0.9	3.2	2.9	-	-	-	-	4.6	0.9	4.2	2.9	5.4	0.9	5.0	2.9	-	-	-	-
VT11	-	-	-	-	4.0	0.8	4.8	2.9	4.6	0.8	5.4	2.9	5.4	0.8	6.2	2.9	6.5	0.8	7.3	2.9

2.9 Motors

2.9.1 Hoisting motors

Table 27. Technical information of VT9 hoisting motor.

Motor type		MF16ZR200N (VT9)	
Speed control		Inverter	
Ventilation		Self circulation	
Motor voltage	[V]	400	460
Frequency	[Hz]	48	55
Connection		Y	Y
Motor code		YD	YD
Synchronous speed	[rpm]	1440	1650
Brake torque	[Nm]	500	500
Starting torque	[Nm]	380	380
Maximum torque	[Nm]	700	700
80 % of max. torque	[Nm]	560	560
Speed at 80 % torque	[rpm]	1320	1535
Current at 80 % torque	[A]	180	180
Brake inertia	[kgm ²]	0.015	0.015
Inertia without brake	[kgm ²]	0.155	0.155
Weight	[kg]	220	220
No-load current		32	32
Stator resistance at 20 [°C]		[Ω]	0.19
S3-40 %	Speed	[rpm]	1390
	Power	[kW]	44
	Current	[A]	85
	Power factor		0.83
	Efficiency		0.91
S3-60 %	Speed	[rpm]	1400
	Power	[kW]	37
	Current	[A]	71
	Power factor		0.82
	Efficiency		0.92
	Short time duty	[min]	60
Encoder type		NM701NR3 (600 ppr)	NM701NR3 (600 ppr)
Brake type		NM40410NR2	NM40410NR2
Insulation class		F/H ¹⁾	F/H ¹⁾
Protection class		IP55	IP55
Cut off bi-metal switch		[°C]	170

Option alarm bi-metal switch	[°C]	150	150
Option heater	[V]	230/115	230/115
Temperature sensor		NTC	NTC
1) Insulation class F/H (temperature rise class F and insulation class H).			

Table 28. Technical information of hoisting motors.

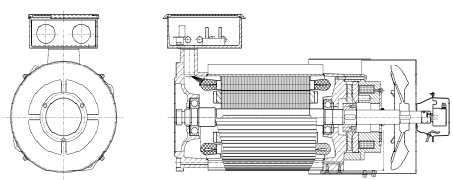
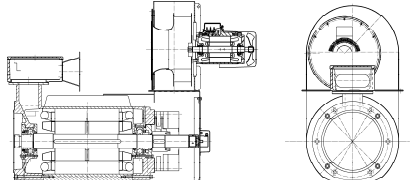
						
Motor type		MF18XR200 (VT10)		MF22LR200 (VT11)		
Speed control		Inverter		Inverter		
Ventilation		Self circulation		Auxiliary fan ²⁾		
Motor voltage	[V]	400	460	400	460	
Frequency	[Hz]	48	55	48	55	
Connection		Y	Y	Y	Y	
Motor code		YD	YD	YE	YE	
Synchronous speed	[rpm]	1440	1650	1440	1650	
Brake torque	[Nm]	800	800	1300	1300	
Starting torque	[Nm]	600	600	1000	1000	
Maximum torque	[Nm]	1200	1200	2400	2400	
80 % of max. torque	[Nm]	960	960	1920	1920	
Speed at 80 % torque	[rpm]	1320	1530	1350	1565	
Current at 80 % torque	[A]	280	280	525	525	
Brake inertia	[kgm ²]	0.014	0.014	0.044	0.044	
Inertia without brake	[kgm ²]	0.305	0.305	0.65	0.65	
Weight	(kg)	330	330	880	880	
No-load current	[A]	40	40	70	70	
Stator resistance at 20 °C	[Ω]	0.10	0.10	0.035	0.035	
S3-60 %	Speed	[rpm]	1400	1610	1410	1620
	Power	[kW]	60	69	94	107
	Current	[A]	109	109	170	170
	Power factor		0.86	0.86	0.86	0.86
	Efficiency		0.91	0.91	0.94	0.94
	Short time duty	[min]	60	60	60	60
Encoder type		NM701NR3 (600 ppr)	NM701NR3 (600 ppr)	NM701NR3 (600 ppr)	NM701NR3 (600 ppr)	
Brake type		NM40420NR2	NM40420NR2	NM40430NR2	NM40430NR2	
Insulation class		F/H ¹⁾	F/H ¹⁾	F/H ¹⁾	F/H ¹⁾	
Protection class		IP55	IP55	IP55	IP55	
Cut off bi-metal switch	[°C]	170	170	170	170	
Option alarm bi-metal switch	[°C]	150	150	150	150	
Option heater	[V]	230/115	230/115	230/115	230/115	
1) Insulation class F/H (temperature rise class F and insulation class H). 2) See table for technical information of the cooling fan.						

Table 29. Technical information of the cooling fan for motor MF22.

Type	NM783NR14	
Voltage [V]	346...500	346...500
Frequency [Hz]	50	60
Connection	Y	Y
Power [kW]	2	3.4
Current [A]	5.8	6.1

2.9.2 Hoisting brake

The hoisting motor is equipped with a D.C. disk brake which has a minimum 200% braking torque. The brake coil has an IP66 protection rating. Rotating parts are without closures to ensure the self cleaning function. A second brake with similar characteristics as the motor brake can be added to the gearbox and is mounted directly across from the hoisting motor.

Figure 5. Hoisting machinery brake configurations.

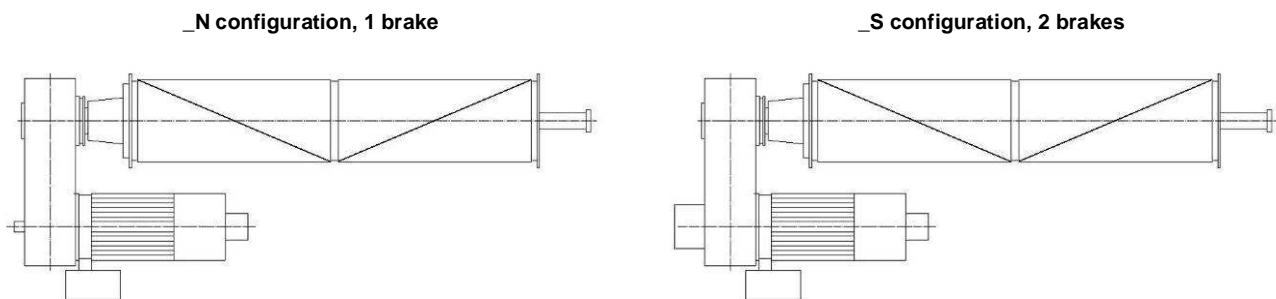


Table 30. Hoisting machinery; standard brake.

Hoisting Trolley Type	Brake Type	Brake Torque [Nm]	Voltage [V]	Current [A]	Boost Voltage [V]	Boost Current [A]	Mass [kg]	Motor
VT9	NM40410NR2	500	180	0.67	360	1.34	47	MF16ZR200N
VT10	NM40420NR2	800	180	0.67	360	1.34	47	MF18XR200N
VT11	NM40430NR2	1300	180	0.87	360	1.73	75	MF22LR200N

Table 31. Hoisting machinery; second brake (optional).

Hoisting Trolley Type	Brake Type	Brake Torque [Nm]	Voltage [V]	Current [A]	Boost Voltage [V]	Boost Current [A]	Mass [kg]
VT9	NM40412NR2	500	180	0.67	360	1.34	47
VT10	NM40422NR2	800	180	0.67	360	1.34	47
VT11	NM40432NR2	1300	180	0.87	360	1.73	75

2.9.3 Travelling motors

The travelling motors are equipped with IP55 protection and tropical impregnation as standard as well as bi-metal over temperature switches.

Table 32. Technical information of travelling motors (VES machineries).

Motor type		MF07XA200		
Motor length	[mm]	321		
Speed control		Inverter		
Ventilation		Self circulation		
Motor voltage	[V]	400	460	
Frequency	[Hz]	96	110	
Connection		Y	Y	
Motor code		Y1	Y1	
Synchronous speed	[rpm]	2880	3300	
Brake torque	[Nm]	16	16	
Starting torque	[Nm]	12.7	12.7	
Starting current	[A]	19.4	19.4	
Maximum torque	[Nm]	16.5	16.5	
80 % of max. torque	[Nm]	13.1	13.1	
Speed at 80 % torque	[rpm]	2420	2840	
Current at 80 % torque	[A]	10.6	10.6	
Brake inertia	[kgm ²]	0.00006	0.00006	
Inertia without brake	[kgm ²]	0.0012	0.0012	
Power factor, starting		0.63	0.63	
Weight	[kg]	13	13	
No-load current	[A]	2.7	2.7	
Stator resistance at 20 [°C]	[Ω]	6.3	6.3	
S3-60 %	Speed	[rpm]	2710	3130
	Power	[kW]	1.44	1.66
	Current	[A]	4.1	4.1
	Power factor		0.76	0.76
	Efficiency		0.76	0.76
	Short time duty	[min]	60	60
Brake type		NM38770NR2		
Insulation class		F/H ¹⁾	F/H ¹⁾	
Protection class		IP55	IP55	
Cut off bi-metal switch	[°C]	170	170	
Option alarm bi-metal switch	[°C]	150	150	
Option heater	[V]	230/115	230/115	
1) Insulation class F/H (temperature rise class F and insulation class H)				

Table 33. Technical information of travelling motors (QM06 and QM07 machineries).

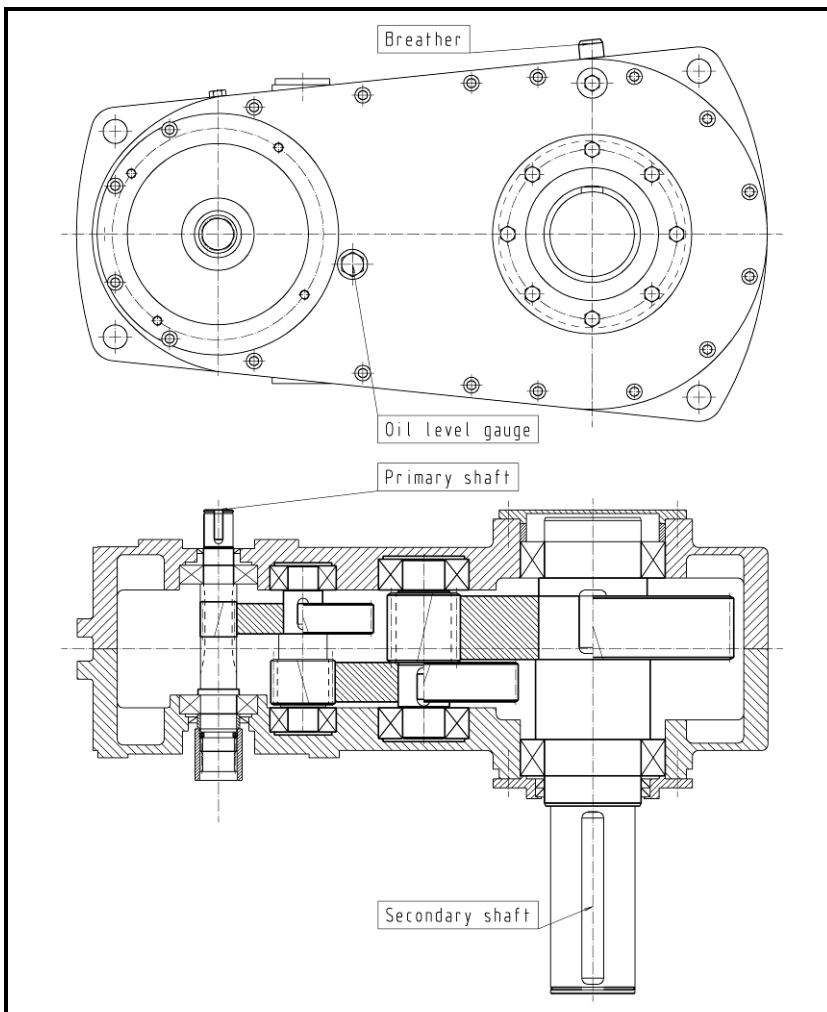
Motor type	MF10ZM200		MF10ZM200		MF11XM200		MF11XM200		
Motor length [mm]	422		422		652		652		
Speed control	Inverter		Inverter		Inverter		Inverter		
Ventilation	Self circulation		Self circulation		Self circulation		Self circulation		
Motor voltage [V]	400		460		400		460		
Frequency [Hz]	48	80	55	92	48	80	55	92	
Connection	Y	D	Y	D	Y	D	Y	D	
Motor code	Y2	D2	Y2	D2	Y3	D3	Y3	D3	
Synchronous speed [rpm]	1440	2400	1650	2760	1440	2400	1650	2760	
Brake torque [Nm]	42	42	42	42	60	60	60	60	
Starting torque [Nm]	80	80	80	80	130	140	130	140	
Starting current [A]	37	75	37	75	80	155	80	155	
Maximum torque [Nm]	80	100	80	100	150	170	150	170	
80 % of max. torque [Nm]	64	80	64	80	120	136	120	136	
Speed at 80 % torque [rpm]	570	1110	780	1720	790	1730	1000	2090	
Current at 80 % torque [A]	19	43	19	43	39	77	39	77	
Brake inertia [kgm ²]	0.00045	0.00045	0.00045	0.00045	0.0007	0.0007	0.0007	0.0007	
Inertia without brake [kgm ²]	0.0049	0.0049	0.0049	0.0049	0.0101	0.0101	0.0101	0.0101	
Power factor, starting	0.80	0.73	0.80	0.73	0.56	0.56	0.56	0.68	
Weight [kg]	32	32	32	32	51	51	51	51	
No-load current [A]	5.9	9.5	5.9	9.5	11	18	11	918	
Stator resistance at 20 [°C] [Ω]	3.2	1.0	3.2	1.0	1.38	0.46	1.38	0.46	
S3-60 %	Speed [rpm]	1270	2270	1480	2630	1340	2280	1550	2640
	Power [kW]	2.8	4	3.3	4.6	6	10	7	12
	Current [A]	7.5	12	7.5	12	15	27	15	27
	Power factor	0.76	0.63	0.76	0.63	0.76	0.70	0.76	0.70
	Efficiency	0.74	0.76	0.74	0.76	0.83	0.84	0.83	0.84
	Short time duty [min]	60	60	60	60	60	60	60	60
Brake type	NM38730NR2				NM38740NR2				
Insulation class	F/H ¹⁾	F/H ¹⁾	F/H ¹⁾	F/H ¹⁾	F/H ¹⁾	F/H ¹⁾	F/H ¹⁾	F/H ¹⁾	
Protection class	IP55	IP55	IP55	IP55	IP55	IP55	IP55	IP55	
Cut off bi-metal switch [°C]	170	170	170	170	170	170	170	170	
Option alarm bi-metal switch [°C]	150	150	150	150	150	150	150	150	
Option heater [V]	230/115	230/115	230/115	230/115	230/115	230/115	230/115	230/115	
1) Insulation class F/H (temperature rise class F and insulation class H).									

2.10 Gears

2.10.1 Hoisting gear

The hoisting gearbox has three reduction steps and uses helical gearing. The hoisting gearbox is designed specifically for hoists.

Figure 6. Information of the hoisting gear on winch.

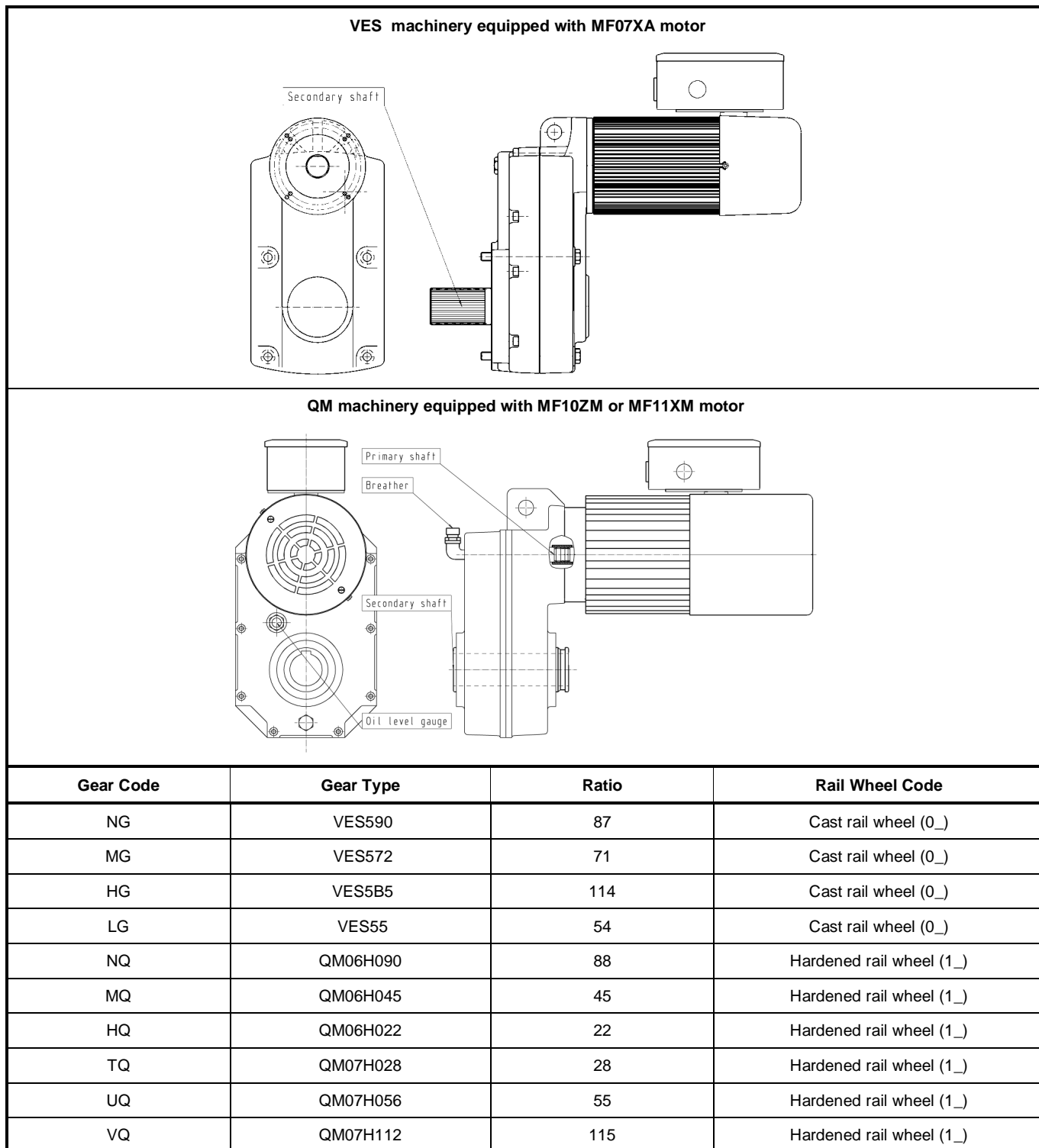


Hoisting Trolley Type	Gear Code	Gear Type	Ratio
VT9	N_	TSC3225-81	82
VT10	N_	TSC3280-105	105
VT11	N_	TSC33552HYX901-128	128

2.10.2 Travelling machinery gear

The trolley is equipped with two travelling machineries.

Figure 7. Information of the travelling gear on hoisting trolleys.

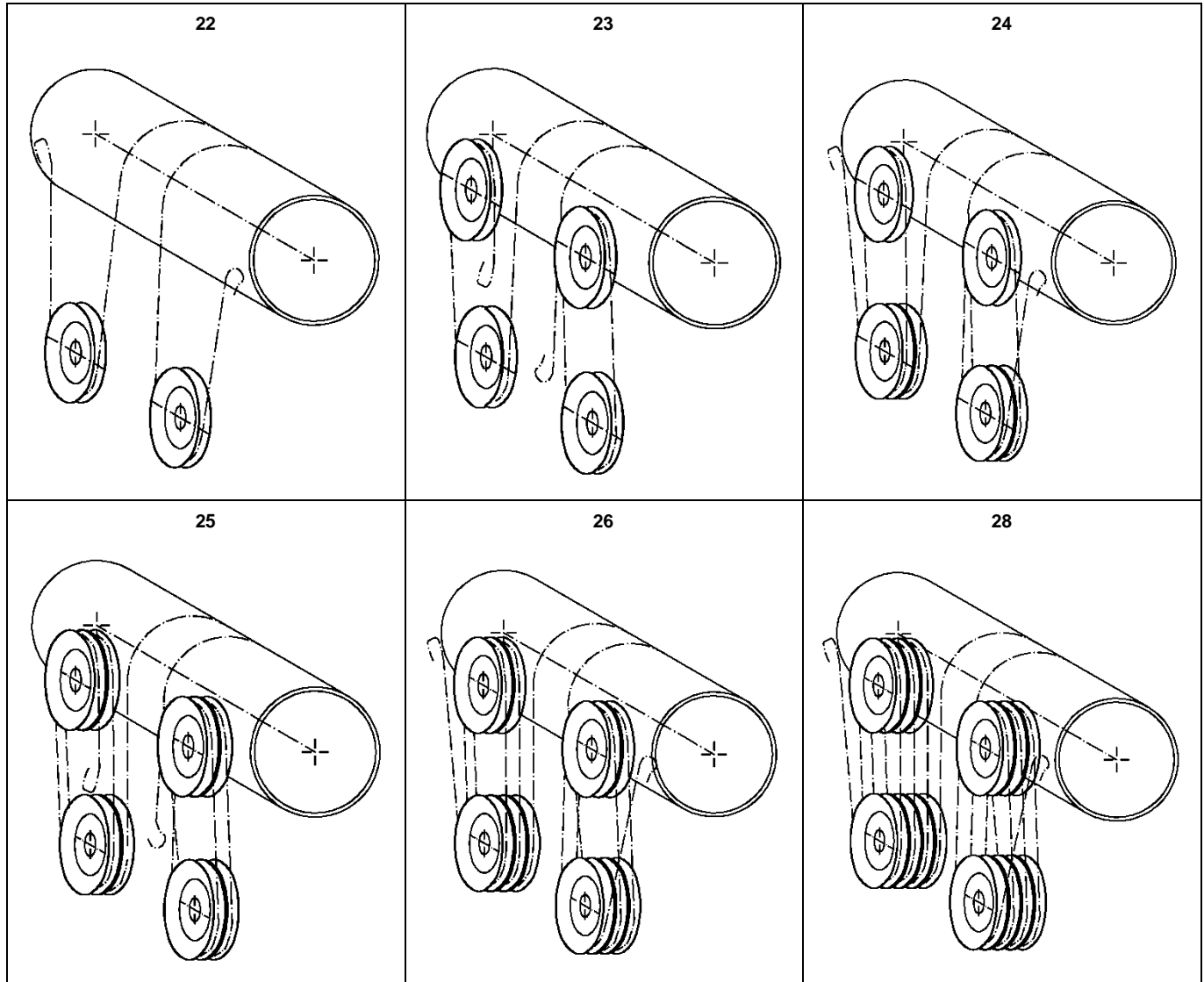


2.11 Rope reeving components

2.11.1 Rope reeving codes

The reeving type is true vertical lift with two separate ropes. Six different reeving configurations are available.

Figure 8. Rope reeving codes.



2.11.2 Rope drum

Table 34. Hoisting trolley rope drum data.

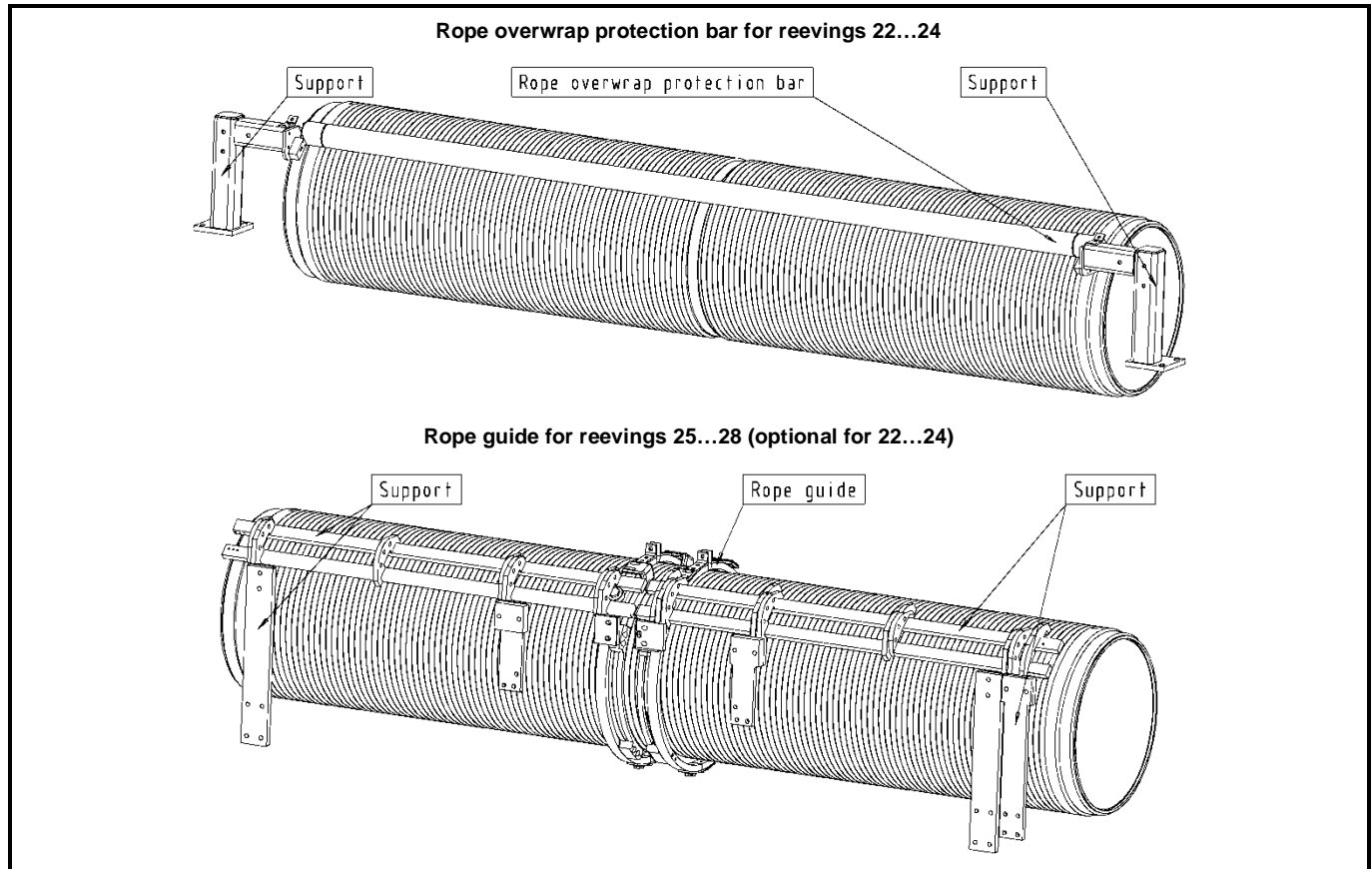
Hoisting Trolley Type	Rope Diameter d [mm]	Pitch P [mm]	Drum Diameter D [mm]	Ratio D/d ¹⁾
VT9	14	15.5	444	31.7
VT10	18	20	590	32.8
VT11	22	24.5	730	33.2

1) Ratio D/d exceeds the requirements of standards FEM, EN and CMAA.

2.11.3 Rope guarding

The rope overwrap protection bar includes slack rope supervision as a standard feature. Hoisting trolley is equipped with rope guide or overwrap protection.

Figure 9. Hoisting trolley rope guide.



2.11.4 Rope sheaves

Table 35. Hoisting trolley rope sheave data.

Hoisting Trolley Type	Rope Diameter d [mm]	Rope Sheave Diameter D [mm]	Ratio D/d ¹⁾
VT9	14	336	24
VT10	18	420	23.3
VT11	22	540	24.5

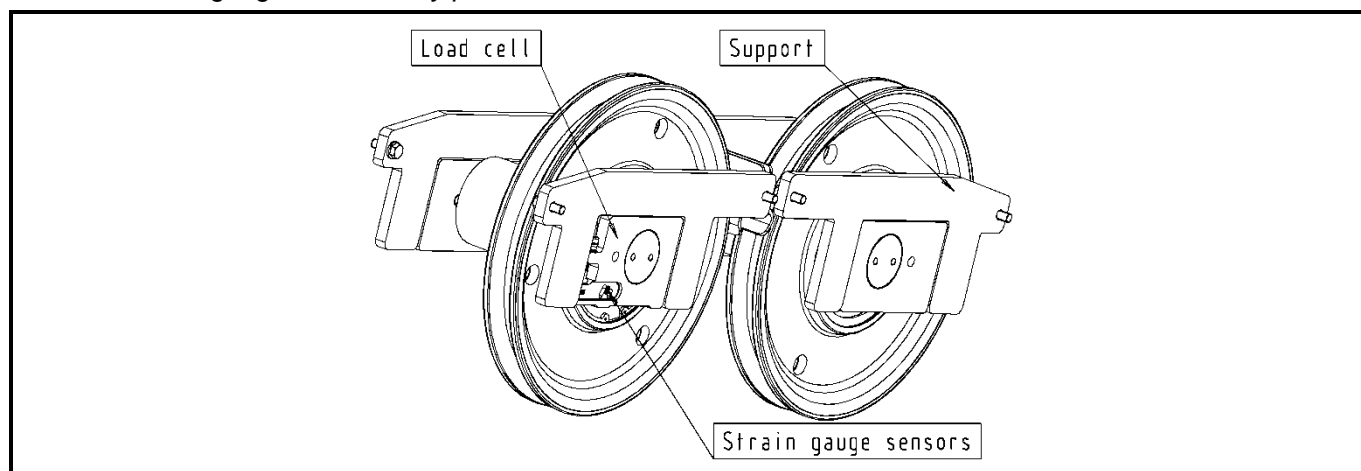
1) Ratio D/d exceeds the requirements of standards FEM, EN and CMAA.

2.11.5 Load measuring

The hoisting trolley is equipped with a strain gauge type load sensor for detecting the magnitude of the lifted load. The reading is used in the overload protection feature. The sensors are located on the upper sheave block support.

NOTE! MT2 condition monitoring unit has been setup with only the basic factory parameters. Calibrating the MT2 must be performed at the commissioning of the unit.

Table 36. Strain gauge sensor array position.



2.12 Rope reeving properties

2.12.1 Rope angle from drum

Figure 10. Maximum rope angles for different winch configurations.

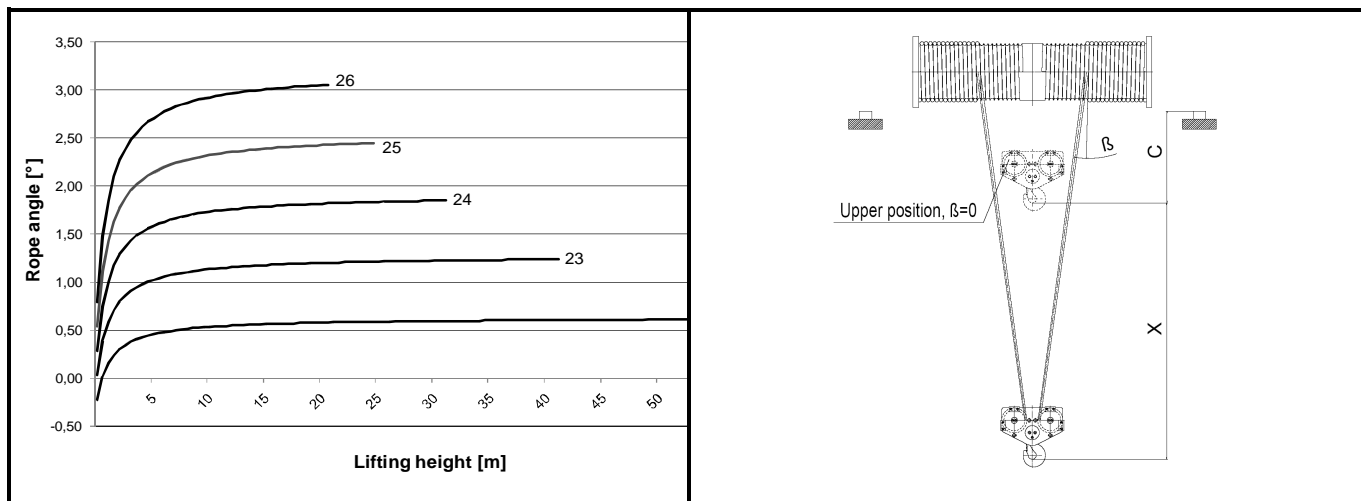


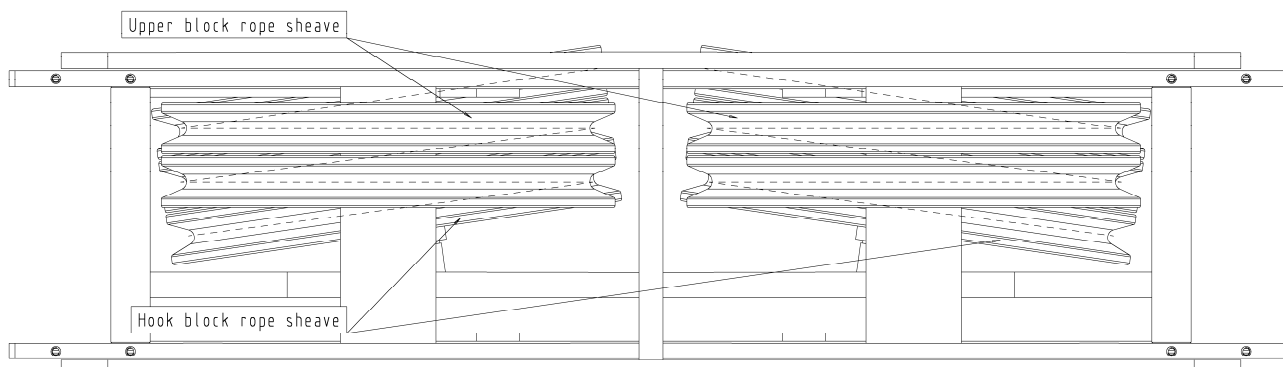
Table 37. Recommended maximum rope angle during working cycle based on FEM standard.

Duty Code	Duty Cycles	Recommended Maximum Angle During Normal Working Cycle [°]
03	32 000	4
04	63 000	3.5
05	125 000	3.5
06	250 000	3

2.12.2 Rope angle from rope sheave to rope sheave

The rope sheaves in the hook block are arranged in an angular position so the ropes coming from the upper sheave block are without a fleet angle. This design reduces wear on the ropes and the sheaves.

Figure 11. Angular arrangement of the rope sheaves in the hook block.



2.13 Hoisting rope

2.13.1 Safety factors according to standards

EN standard

There is no fixed safety factor according to duty. All properties of the reeving system effect on rope lifetime equally. In the hoisting trolley series there is a bigger rope sheave to rope ratio used than reference in EN to ensure a longer rope lifetime.

FEM standard

Table 38. Rope safety factors according to FEM standard.

FEM Duty Class	1Bm	1Am	2m	3m
Safety factor	3.55	4	4.5	5.6

CMAA standard

The CMAA standard requires a safety factor of 5:1 in all duty classes. Winches for American markets will be equipped with suitable ropes.

2.13.2 Ropes of the hoisting trolley series

Following tables are for hoisting trolley rope types and detailed explanations.

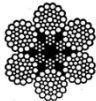
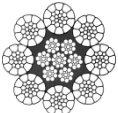

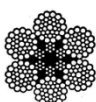
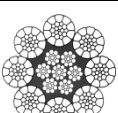
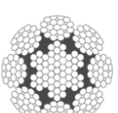
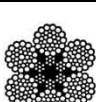
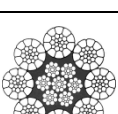
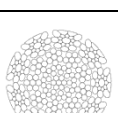
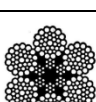
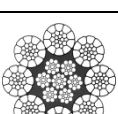
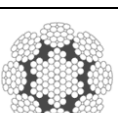
Table 39. Rope choice overview for VT9 hoisting trolleys.

Hoisting Trolley Type	Duty Code	EN	FEM	CMAA
		Rope Type	Rope Type	Rope Type
VT922	06	Rope 1	Rope 1	Rope 1
	05	Rope 1	Rope 1	Rope 3
VT923	06	Rope 1	Rope 2	Rope 1
	05	Rope 1	Rope 2	Rope 3
VT924	06	Rope 1	Rope 1	Rope 1
	05	Rope 1	Rope 1	Rope 3
	04	Rope 1	Rope 1	Rope 3
	03	Rope 1	Rope 1	Rope 3
VT925	06	Rope 1	Rope 1	Rope 1
	05	Rope 1	Rope 1	Rope 3
	04	Rope 1	Rope 1	Rope 3
	03	Rope 1	Rope 1	Rope 3
VT926	06	Rope 1	Rope 2	Rope 1
	05	Rope 1	Rope 2	Rope 3
	04	Rope 1	Rope 2	Rope 3
	03	Rope 1	Rope 2	Rope 3
VT928	05	Rope 1	Rope 1	Rope 3
	04	Rope 1	Rope 1	Rope 3
	03	Rope 1	Rope 1	Rope 3

Table 40. Rope choice overview for VT10 and VT11 hoisting trolleys.

Hoisting Trolley Type	Duty Code	EN	FEM	CMAA
		Rope Type	Rope Type	Rope Type
VT1022	06	Rope 4	Rope 4	Rope 4
	05	Rope 4	Rope 4	Rope 6
VT1023	06	Rope 4	Rope 4	Rope 4
	05	Rope 4	Rope 4	Rope 6
VT1024	06	Rope 4	Rope 4	Rope 4
	05	Rope 4	Rope 4	Rope 6
	04	Rope 4	Rope 4	Rope 6
	03	Rope 4	Rope 4	Rope 6
VT1025	06	Rope 4	Rope 4	Rope 4
	05	Rope 4	Rope 4	Rope 6
	04	Rope 4	Rope 4	Rope 6
	03	Rope 4	Rope 4	Rope 6
VT1026	06	Rope 4	Rope 4	Rope 4
	05	Rope 4	Rope 4	Rope 6
	04	Rope 4	Rope 4	Rope 6
	03	Rope 4	Rope 4	Rope 6
VT1028	05	Rope 4	Rope 4	Rope 6
	04	Rope 4	Rope 4	Rope 6
	03	Rope 4	Rope 4	Rope 6
VT1122	06	Rope 7	Rope 7	Rope 7
	05	Rope 7	Rope 7	Rope 9
VT1123	06	Rope 7	Rope 7	Rope 7
	05	Rope 7	Rope 8	Rope 9
VT1124	06	Rope 7	Rope 7	Rope 7
	05	Rope 7	Rope 7	Rope 9
	04	Rope 7	Rope 7	Rope 9
	03	Rope 7	Rope 7	Rope 9
VT1125	06	Rope 7	Rope 7	Rope 7
	05	Rope 7	Rope 7	Rope 9
	04	Rope 7	Rope 7	Rope 9
	03	Rope 7	Rope 7	Rope 9
VT1126	06	Rope 7	Rope 8	Rope 7
	05	Rope 7	Rope 8	Rope 9
	04	Rope 7	Rope 8	Rope 9
	03	Rope 7	Rope 7	Rope 9
VT1128	05	Rope 7	Rope 7	Rope 9
	04	Rope 7	Rope 7	Rope 9
	03	Rope 7	Rope 7	Rope 9

Table 41. Rope types.

Rope Type		Hoisting Trolley	Strength Grade [MPa]	Diameter [mm]	MBL [kN]
	Rope 1	VT9	2160	14	151
	Rope 2		1960	14	175,4
	Rope 3		2160	14	208,7
	Rope 4	VT10	2160	18	248
	Rope 5		1960	18	289,7
	Rope 6		2160	18	345
	Rope 7	VT11	2160	22	371
	Rope 8		1960	22	434,2
	Rope 9		2160	22	515,4
	Rope 10	VT12	2160	28	603
	Rope 11		1960	28	702,9
	Rope 12		2160	28	834,9

2.14 List of materials and bearings

2.14.1 Used materials

This chapter gives an overview of the materials used in the hoisting trolleys. Please compare the positions in figure with the descriptions following table.

Figure 12. Overview of materials.

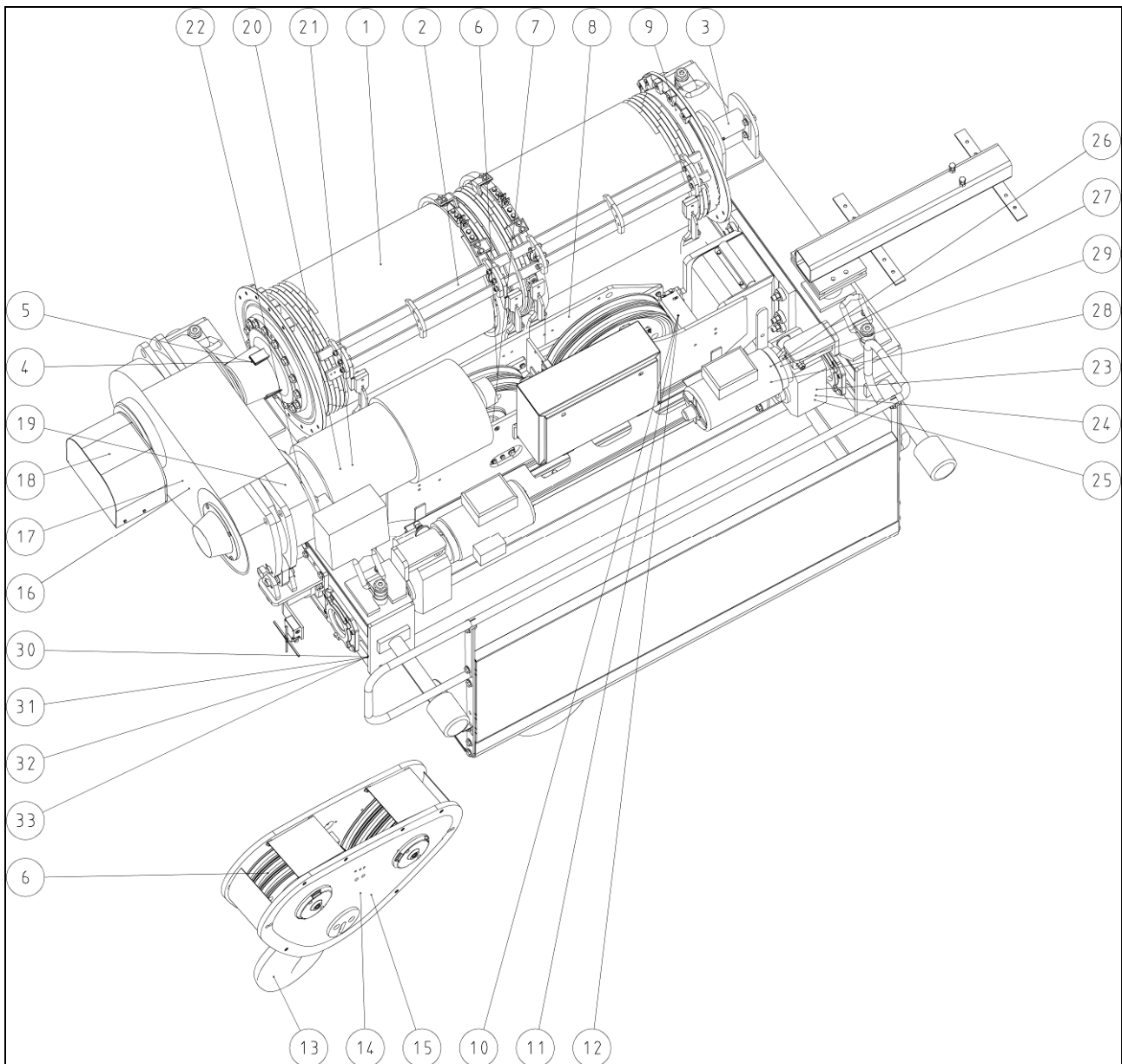


Table 42. List of used materials in the hoisting trolley series.

No.	Part	Fabrication Method							Material								Finishing					
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	Description	Standard	1	2	3	4
Hoist frame																						
1	Drum						•	•									S355J2G3	EN10025				
2	Rope guide parts	•						•							•		EN-GJS-500	EN1563	•			
	Rope guide frame							•	•								S355J2G3	EN10025	•			
	Overwrap protection bar							•	•								S355J2G3	EN10025	•			
3	Shaft						•							•			42CrMo4	EN10083		•		
Drum hub																						
4	Hub	•						•							•		EN-GJS-700	EN1563	•			
5	Hub key							•						•			42CrMo4	EN10083				
Rope sheave assemblies																						
6	Rope sheaves	•						•							•		EN-GJS-700	EN1563	•			
7	Rope sheave shafts							•						•			42CrMo4	EN10083				
8	Support beam							•						•			S355J2G3	EN10025	•			
Rope anchorage																						
9	Rope clamps							•	•								S355J2G3	EN10025				
10	Rope anchorage housing	•													•		EN-GJS-400	EN1563	•			
11	Rope anchorage wedge	•													•		EN-GJS-400	EN1563	•			
12	Rope anchorage shaft							•						•			42CrMo4	EN10083				
Hook																						
13	Hook forging		•					•							•		34CrMo4	EN10083	•			
14	Hook block housing							•							•		42CrMo4	EN10083	•			
15	Hook block frame						•	•						•			S355J2G3	EN10025	•			
Hoisting gearbox																						
16	Gearbox housing	•													•		EN-GJL-200	EN1561	•			
17	Gear wheels and geared shafts							•	•						•		20NiCrMo2	EN10084				
								•	•						•		17NiCrMo6	EN10084				
									•	•						•		18CrNiMo7	EN10084			
18	Secondary shaft							•						•			42CrMo4	EN10083				
19	Coupling							•	•								S355J2G3	EN10025				

Table 43. List of used materials in the hoisting trolley series (continued).

No.	Part	Fabrication Method							Material								Finishing						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	Description	Standard	1	2	3	4	
Hoisting motor																							
20	Motor frame			•			•										•	AlMgSi-T5	EN573			•	
21	Rotor shaft						•						•					42CrMo4	EN10083				
22	Mounting flange	•					•									•		EN-GJL-200	EN1561	•			
Travelling gearbox																							
23	Gearbox housing VES	•															•	G-AISI10Mg	EN1706	•			
	Gearbox housing QM	•												•				EN-GJL-200	EN1561	•			
24	Gear wheels and geared shafts						•	•				•						20NiCrMo2	EN10084				
							•	•				•						17NiCrMo6	EN10084				
							•	•				•							18CrNiMo7	EN10084			
25	Secondary shaft						•		•									S355J2G3	EN10025				
26	Coupling						•		•									S355J2G3	EN10025	•			
Travelling motor																							
27	Motor frame			•			•										•	AlMgSi-T5	EN573			•	
28	Rotor shaft						•						•					42CrMo4	EN10083				
29	Mounting flange	•															•	G-AISI10Mg	EN1706	•			
Trolley																							
30	Rail wheels VES	•					•									•		EN-GJS-700	EN1563	•			
	Rail wheels QM						•		•									42CrMo4	EN10083				
31	Rail wheel shafts						•		•									42CrMo4	EN10083				
32	Rail wheel supports	•					•								•			EN-GJS-400	EN1563	•			
							•			•									S355J2G3	EN10025	•		
33	Trolley end carriages						•		•									S355J2G3	EN10025				

2.14.2 Overview of bearings

The following table gives an overview of the used bearing types in the hoisting trolley series as well as information about their lubrication and sealing configuration.

Table 44. Overview of hoisting trolley bearings.

Bearing	Bearing Type						Sealing Type		Lubrication Type		
	1	2	3	4	5	6	Sealed	Not Sealed	1	2	3
	1: Deep Groove Ball Bearing 2: Cylinder. Roller Bearing 3: Needle Roller Bearing 4: Spherical Roller Bearing 5: Thrust Ball Bearing 6: Cylinder. Roller Thrust Bearing								1: Life Time Lubrication 2: Manual Lubrication 3: Oil Bath Lubrication		
Hoisting machinery											
Drum bearing (opposite to gear end)				•			•			•	
Rope sheaves		•					•		•		
Hook forging						•		•		•	
Hoisting gearbox (gear wheel shafts)	•							•			•
				•				•			•
		•						•			•
Hoisting motors											
Rotor shaft (secondary shaft end)	•						•		•		
Rotor shaft (brake end)	•						•		•		
Travelling machineries											
Gearbox (inside)	•							•			•
Travelling motor (secondary shaft end)	•						•		•		
Travelling motor (brake end)	•						•		•		
Rail wheels				•			•			•	

2.15 Surface treatment

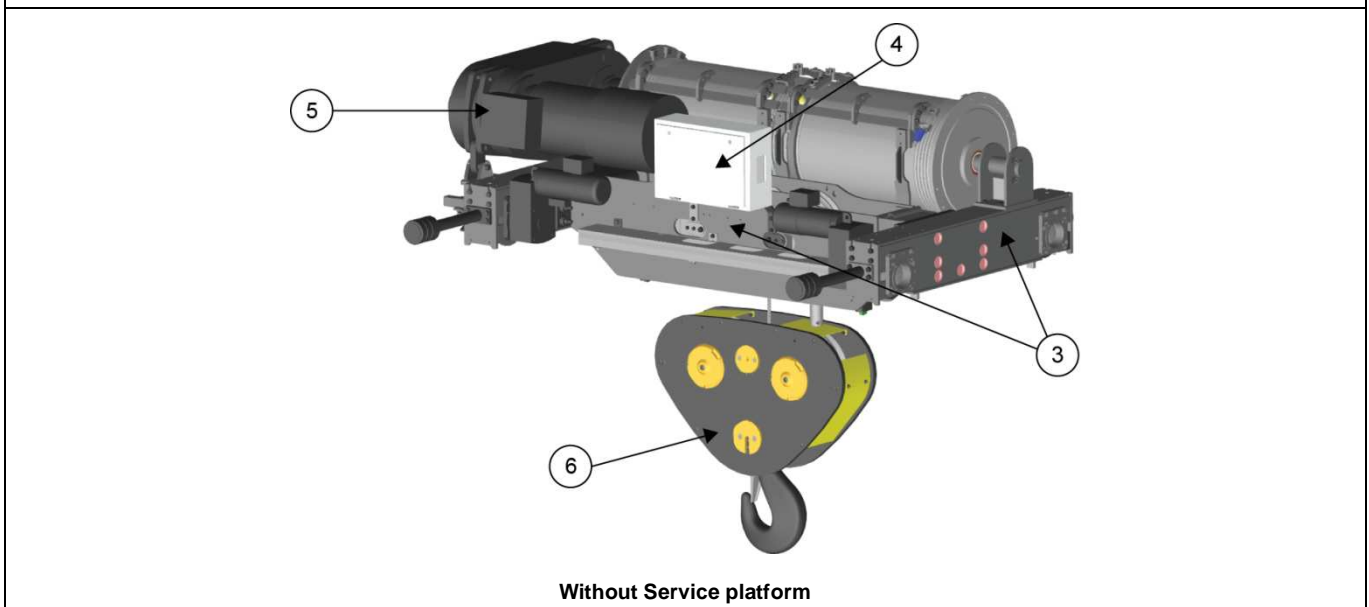
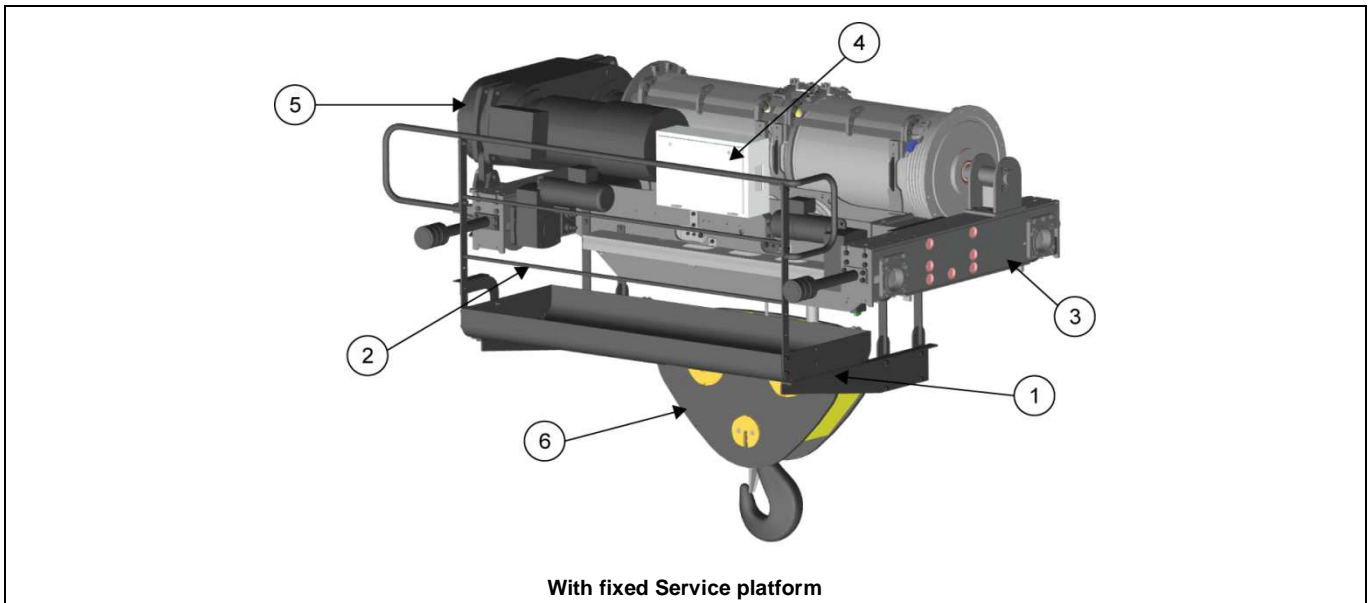
2.15.1 Standard painting system

Table 45. Painting system

Product group		Load carrying steel parts	Outfitting steel parts
Parts and components Etc.		End plate Support beam Pulley support Hook forging Hookd side plate Trolley	Cover
Corrosivity category		C2	
Standard/ Painting system		SFS-EN ISO 12944-5 EP120/2-FeSa2½	
Steel work		05 (SFS 8145)	
Preliminary treatment		Wash, removal of grease Shot blasting Sa2½	Wash, removal of grease Zinc- or iron phosphate
WET	Priming paint	Epoxy priming paint 1x60 µm	
	Finishing paint	Epoxy finishing paint 1x60 µm	
	Total paint thickness	120 µm	
POWDER	Total paint thickness	100 µm	

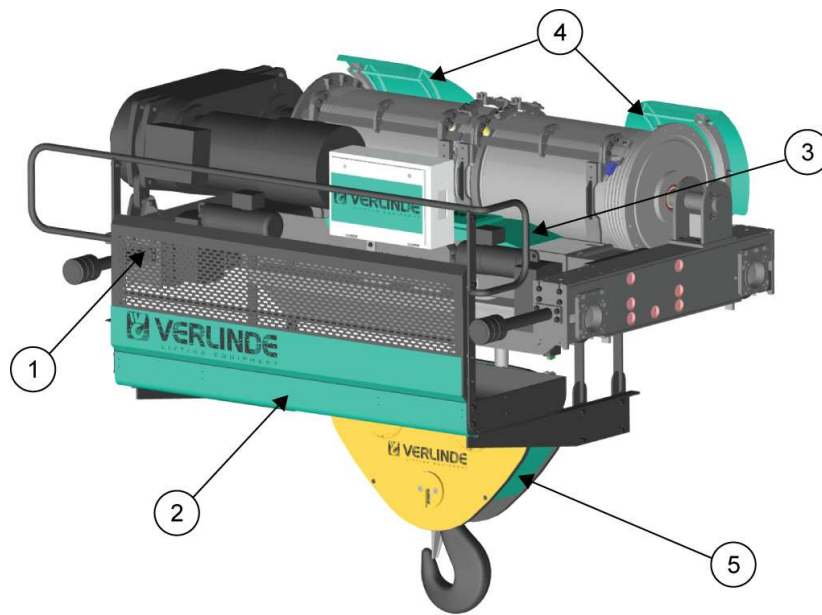
2.15.2 Color codes

Table 46. Colors of the basic body.

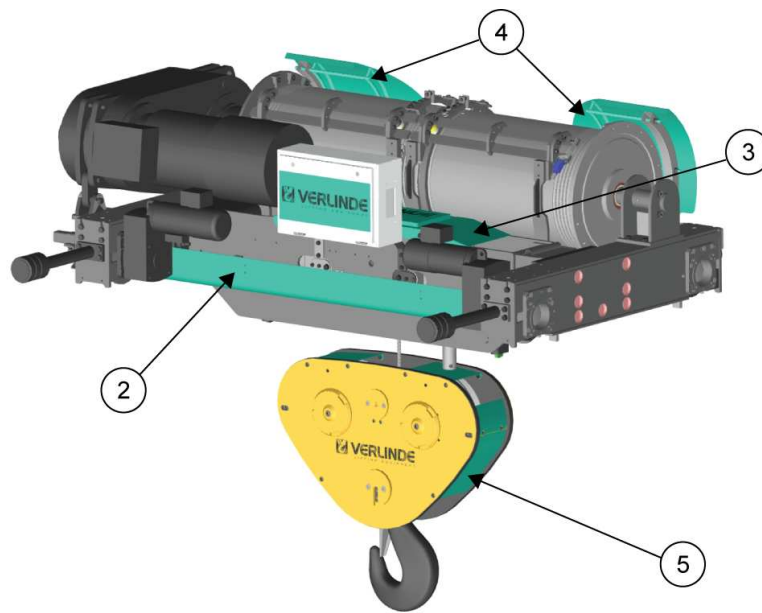


Item	Structure	Color
1	Service platform fixed	RAL7021
2	Service platform handrails	RAL7021
3	Steel structure	RAL7040
4	Electric cubicle	RAL7035
5	Machineries	RAL7021
6	Hook side plate Hook block forging Rope pulleys Parts for rope fastening	RAL7021

Table 47. Colors of covers.



With Service platform



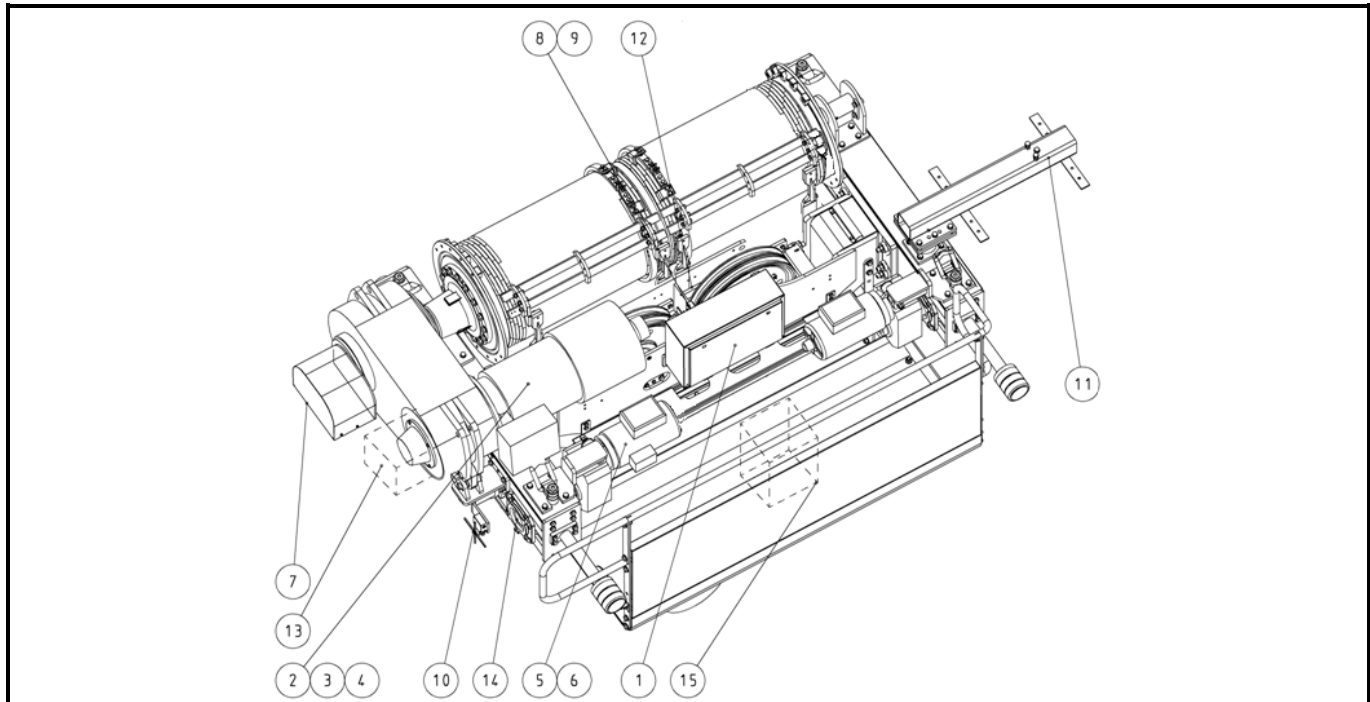
Without Service platform

Item	Structure	Color
1	Service platform side plate	RAL7021
2	Cover	DZ 2369
3	Load beam cover	DZ 2369
4	Drum covers	DZ 2369
5	Hook protection covers	DZ 2369

2.16 Electrics

2.16.1 Hoisting trolley layout

Table 48. Electric components overview.



Pos.	Component	Description	Notice
1	Terminal box	600x400x200 IP55	-
2	Hoisting motor	See hoisting motor tables	-
3	Hoisting brake	See hoisting motor tables	-
4	Hoisting encoder	See hoisting motor tables	-
5	Travelling motor	See travelling motor tables	-
6	Travelling motor brake	See travelling motor tables	-
7	Mechanical hoisting limits	Geared hoisting limit switch	4-step (Lower, extra level, slow-down and upper limit)
8	Up stop limit switch	Weight operated limit switch	Auto reset
9	Up safety limit switch	Weight operated ultimate limit switch	Manual release
10	Mechanical travelling limits	Crossed metal rods-type	(2-step) Slow down + stop
11	Cable towing arm	See towing arm table	-
12	Load cell	See load measuring section	Used for overload detection and load display
13	Option, second brake	See brake tables	-
14	Option, storm lock switch	On / off detection	Travelling not possible when on
15	Option, power feed to hook block		-

2.16.2 1.1.1 Hoisting limits

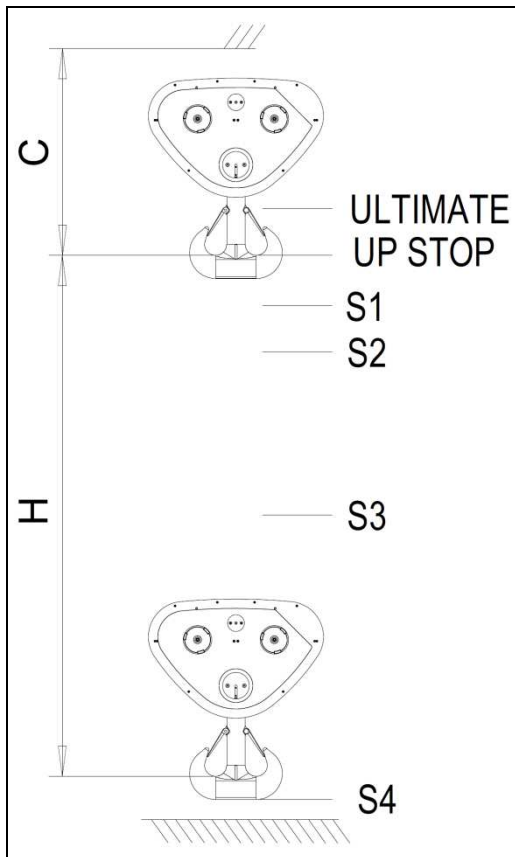


Figure 13. Hoisting limits

ULTIMATE = Ultimate safety limit (Weight operated limit switch. Load can be laid down after operation but manual reset is needed for hoisting.)

UP STOP = Upper stop limit (Auto reset)

S1 = Slow-down limit for hoisting

S2 = ESR Slow-down limit for hoisting (Option)

S3 = Extra level limit for hoisting (Operation of the extra level limit shall be defined in the order.)

S4 = Lower limit for hoisting

C = Minimum distance of hook from bearing surface of hoist travel wheel

H = Maximum lifting height

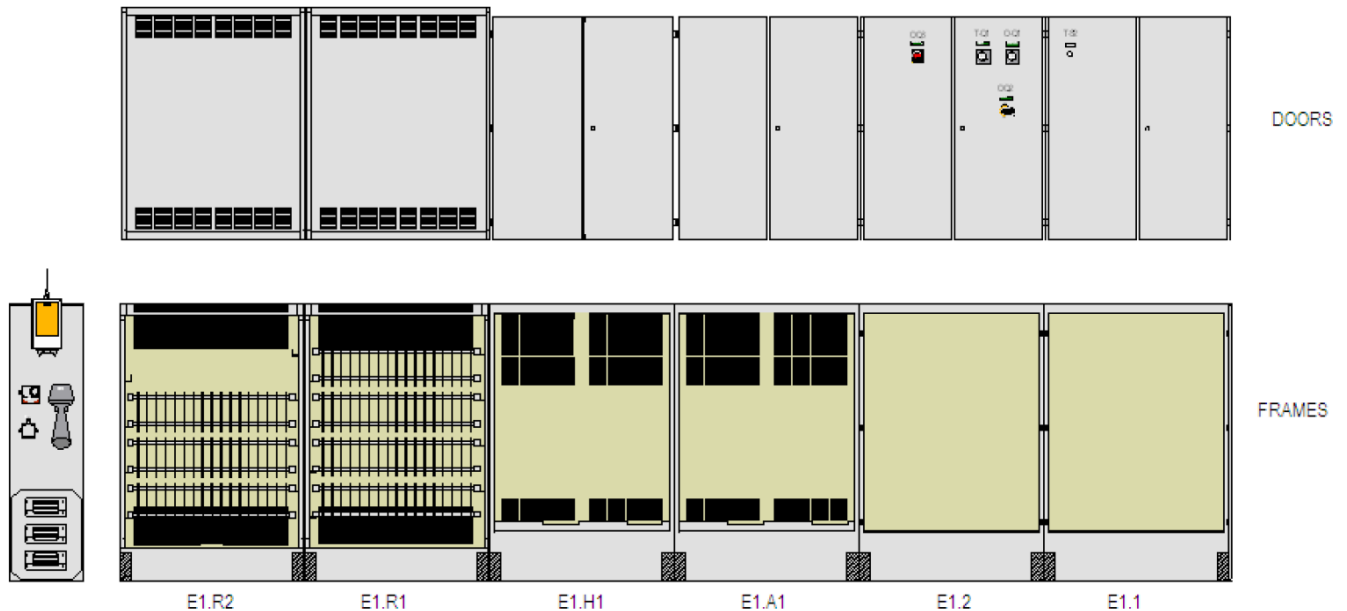
3 BRIDGE PANEL

3.1 Product code of bridge panel

VCROW	PRODUCT NAME											
	Y HOISTING MOTOR CONNECTION (HM17)											
	Y = Inverter control Y-connection											
	D HOISTING MOTOR SIZE (HM18)											
	C = MF16ZR200 (VT9) D = MF18XR200 (VT10) E = MF22LR200 (VT11 and VT12)											
	-											
	1 NUMBER OF HOIST ON THE BRIDGE											
	C TROLLEY TRAVEL CONTROL (TR01)											
	C = Frequency control 2TA mounted in bridge panel											
	C BRIDGE TRAVEL CONTROL (BT01)											
	C = Frequency control 2TA mounted in bridge panel 0 = No bridge travelling units											
	B PANEL SIZE (PAN05)											
	B = Height 1500, depth 400 mm (H15)											
VCROW	Y	D	-	1	C	C	B	00	-	20	J	N
SELECTION OF THE HOISTS (PE13, REM19)												
00 = Without selection												
V2 = 2-position selector switch, two hoists controlled separately (I, II)												
V3 = 3-position selector switch, two hoists can be controlled separately or in tandem use (I, I+II, II)												
VE = Special selection. (V7, S3, VM or specify by free text) 00												
MAIN VOLTAGE (ELE01)												
20 = 50 Hz : (Main voltage / 10) - 20 e.g. (400V / 10) - 20 = 20												
76 = 60 Hz : (Main voltage / 10) + 30 e.g. (460V / 10) + 30 = 76 etc. 20												
CONTROL VOLTAGE (ELE02)												
J = 115 V												
N = 230 V J												
SYSTEM FEATURES												
N = Standard VCROW												
E = Special application N												

3.2 Standard features

Figure 14. Standard bridge cubicle row.



H15-cubicle series

- Size W1000H1500D400 mm, cable connection point at the festoon end
- Epoxy painting light gray RAL7035
- Cubicle row consists of control cubicles IP55, Inverter cubicles IP54/21 and resistor cubicles IP21
- Amount of cubicles depends on features

Example of standard configuration

- $E1.1 + E1.2 + E1.A1 + E1.H1 + 2 \times E1.R = 6$ cubicles =W6000H1500D400 mm (PAN05) $E1.1 + E1.2 + E1.A1 + E1.H1 + 2 \times E1.R = 6$ cubicles =W6000H1500D400 mm (PAN05)
- E1.1 = terminal cubicle for trolley festoon(s) cables with basic lighting and heating transformer, standard location in the row: at the trolley festoon end.
- E1.2 = power supply cubicle with main switches, main contactor, motor circuit breakers for inverters and for bridge supply, control voltage transformer with selection relays, circuit breakers for lighting and heating circuits.
- E1.A1 = inverters for hoisting 1 and trolley travelling 1 including condition monitoring unit
- E1.H1 = inverter for bridge travelling with motor circuit breakers for bridge motors
- E1.R1 and E1.R2 = resistor cubicles with braking resistors for hoist, trolley and bridge
- Inverter code: VARIATOR LA2 xxxF (for hoisting, closed loop) and VARIATOR TA2 xxxF (for travelling/travelling, open loop)
- Operational functions and wirings ready installed and tested



VARIATOR LA2 and MT2 parameters must be tuned during commissioning.

Basic outfit

- Fluorescent tube lighting in every control cubicle.
- Cubicle lighting control switch on the door of E1.1 cubicle.
- Socket outlets 10 A, one piece outside panel (A1) and an another inside the panel (A1) (USA version with provision)
- Warning horn (buzzer type) ELE05=108 dB
- Wire marking Pliotex (ELE48).

Environmental conditions

- Basic design for ambient temperature: +5...+40°C.
- Other temperatures please consult factory

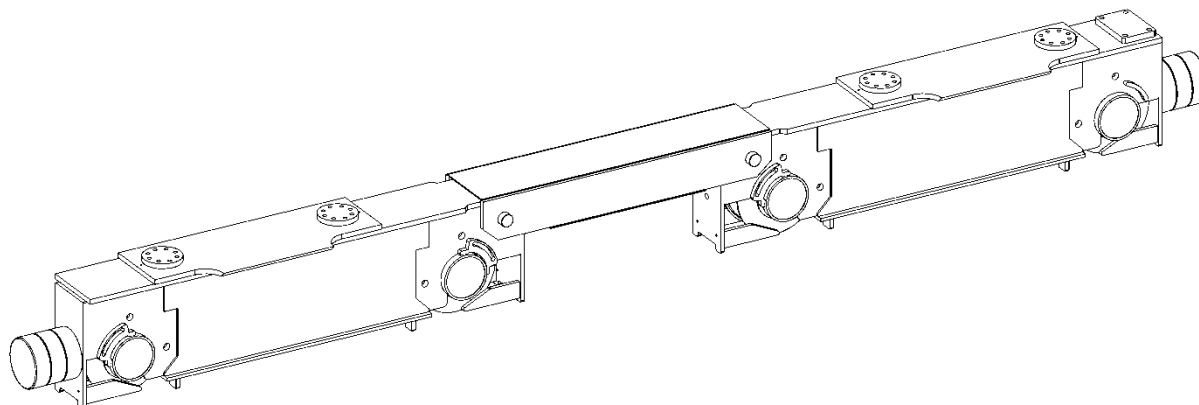
Options

- See pricelist or consult factory

4 BRIDGE END CARRIAGE

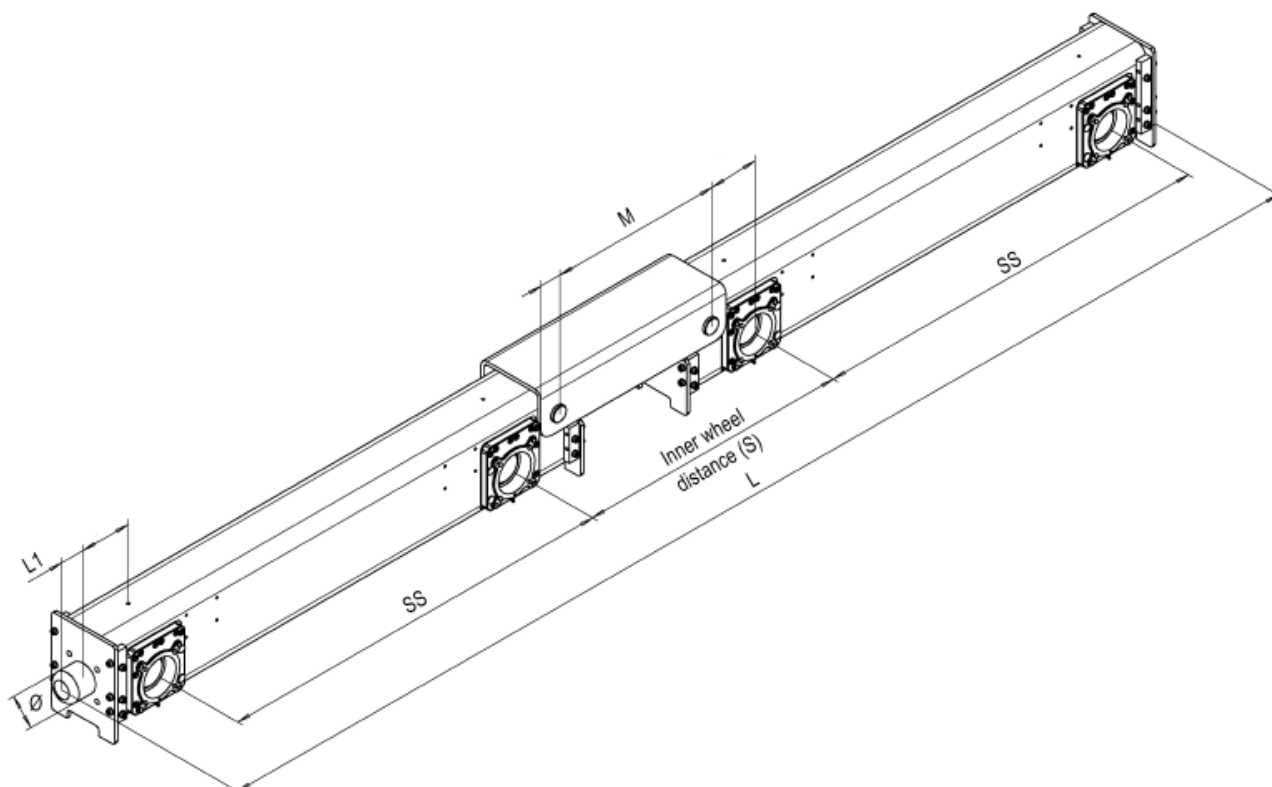
4.1 SHR-End carriage with QM travelling machinery

Figure 15. Bogie type SHR-End carriage.



4.2 GTR-end carriages with VES travelling machinery

Figure 16. Bogie type GTR-End carriage.



5 CONTROLS

The crane can be controlled from a moveable pendant or radio control. The moveable pendant is suspended from a festoon electrification system. With radio control, a backup is optional and can be supplied as needed. The backup pendant would connect directly to the bridge panel and does not require a festoon electrification system.

Figure 17. Control types

Control type	Name
Movable pendant	PENDANT
Radio control	EUROMOTE H

6 FESTOONS

- Festoon for hoisting trolley components

6.1 Features of standard festoon

- Included:
 - Flat cables for hoist power supply and hoist controls
 - Flat cables for movable pendant (if selected)
 - Cable trolleys (Flat cables assembled to cable trolleys)
 - Cable trolley type depends on hoist types and features
- Not included:
 - Power supply rail fixing
 - C-rails or support arms are not include to delivery
 - I-beams are not included to delivery



Crane trolley festoon package does not include crane internal cables e.g. bridge travel motor cables or limit switch cables!