VM15

Profibus DP - Profinet on MULTINET card

Installer manual

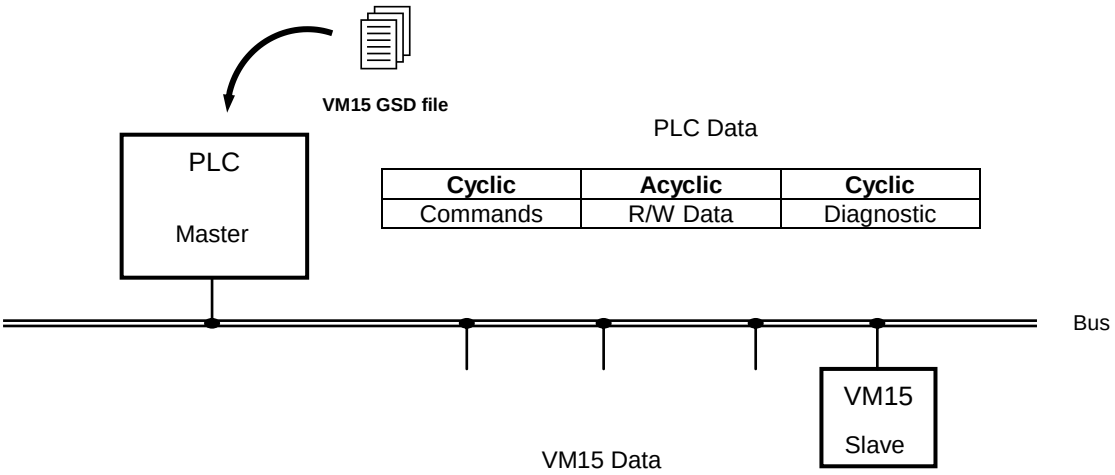
VM15 – Profibus DP – Profinet

9UMEN1503-1200
Release: 220128

VM15 Profibus DP - Profinet on MULTINET card

1. VM15 Profibus DP

1.1. Logical connections



On the master (PLC) is defined the ADDRESS of the VM15 node. This address is checked at start-up. The slave must be configured for the application.

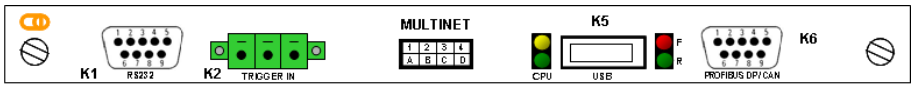
1.2. Profibus device identification

Model name:	Gateway
ID Number:	0CE2 HEX
GSD File name:	BSVM0CE2.GSD
Device Type:	Slave
Protocol Type:	DP
OEM:	Balance Systems

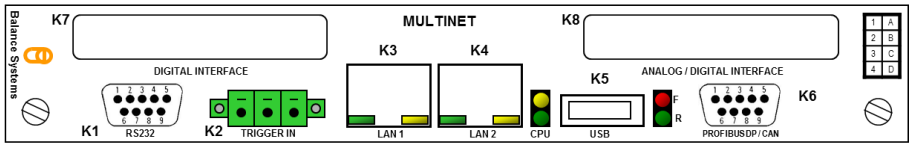
1.3. VM15 system configuration

1.3.1. Connection

The VM15 is connected to the fieldbus by a standard Profibus DP connector K6 present on the MULTINET DP card (p/n 9SHVM15xxMN000, 9SHVM15xxMN020 depending on hardware configuration)

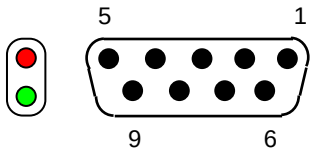


9SHVM15xxMN000



9SHVM15xxMN020

Red led: FAULT
Green led: RUN



PIN	Signal
See EN 50170-2-2	

Connector K6 D-Sub 9 pole female		
PIN	**Name**	**Description**
1	--	N.C.
2	--	N.C.
3	B-Line	Positive Rx/TxD
4	RTS	Request to send (*)
5	GND Bus	Isolated GND (*)
6	+ 5V Bus	Isolated 5V (*)
7	--	N.C.
8	A-Line	Negative Rx/TxD
9	--	N.C.

(*) Not used

1.3.2. Hardware configuration

The complete configuration of the VM15 Profibus node is composed of:

No. 5 function cards

- Balancer (BN type)
- Touch detector (TD type)
- Gauge (AG-NG type)

No. 1 Multinet DP card
No. 1 VM15 control panel or VM15 HMI software

Complex applications with more function cards can be obtained by means of other VM15 nodes connected to the same Profibus net. In these cases each VM15 node is identified by its own address.

IMPORTANT NOTE
On the Multinet card the switch SW2.3 should be setted according to Profibus.
See details on 9UMEN1508-1200 yymmdd VM15 Multinet Parameter

1.3.3. Function cards configuration

Note: Set the access level "INSTALLER"

Balancer / Touch detector / Gauge

SETUP

INPUTS-OUTPUTS
...
Remote control = [**MN**] or [**MN + DI**] or [**MN or DI**]
...

Parameter	Description
Remote control **[OFF]**	**OFF** = Disabled. **VMBus** = Enabling of VMBus internal communication (i.e. 2 plane balancing performed by 2 balancer cards). With this setup all the digital inputs / outputs are enabled. **MN** = Enabling of communication to the Profibus DP interface. Attention: With this setting, all digital inputs of the card are disabled (as they are managed via the Profibus protocol) while the outputs continue to work normally. **MN + DI** = Enabling of data communication to the Profinet interface. All digital inputs and outputs of the card are enabled. Digital inputs (commands) by Profinet protocol are not available. **MN or DI** = Enabling of data communication to the Profinet interface. All digital inputs and outputs of the card are enabled. Digital inputs (commands) by Profinet protocol are also available. **A.O.** = Enabling of the analog output data for additional auxiliary card. This option is available on AG and LG cards only.

1.3.4. Multinet DP software configuration

Note: Set the access level “INSTALLER”

OPTION

FIELDBUS = ON

SETUP

FIELDBUS APPLICATION

FIELDBUS TYPE = PROFIBUS DP (read only, depends on hardware setup)

Parameter	Setup example						
	Type	Config	Interface	Monitor	Diag cmd	Diag sts	Enable
Slave address	5						
SLOT 1	BN 1	1P	STD	2	0	0	ON
SLOT 2	BN 2	1P	STD	0	0	0	ON
SLOT 3	TD 1	AB	STD	2	0	0	ON
SLOT 4	AG 1	AB	AG	2	2	4	ON
SLOT 5	OFF	OFF	OFF	0	0	0	OFF
PLC -> VM15 DATA BLOCK	4						
VM15 -> PLC DATA BLOCK	4						

Parameter	Description
Slave address [5]	Indicates the VM15 node slave address

Parameter	Description		
	Type [OFF]	**Config [OFF]**	**Interface [OFF]**
SLOT 1	Enables the specified function card to be managed by profibus network **OFF** = none **BN x** = Balancer BN x (x = 1, 2, 3, 4) **TD x** = Touch detector TD x (x = 1, 2, 3, 4) **LG x** = Gauge LG x (x = 1, 2) AG x = Gauge AG x (x = 1, 2) **NG x** = Gauge NG x (x = 1, 2, 3, 4)	Function card configuration **OFF** = none. Cyclic data are disabled (only cyclic monitor can be used) **1P** = 1 plane **A** = Section A	Type of I/O interface **All slot except AG and NG gauge:** **STD** = default type **For AG and NG gauge slot only:** **LG** = AG compatible with LG gauge **AG** = AG gauge **NG = NG gauge**
SLOT 2	(see above)	(see above)	(see above)
SLOT 3	(see above)	(see above)	(see above)
SLOT 4	(see above)	(see above)	(see above)
SLOT 5	(see above)	(see above)	(see above)

Parameter	Description			
	Monitor [0]	**Diagnostic commands [0]**	**Diagnostic states [0]**	**Enable [OFF]**
SLOT 1	Enable the Data monitor **0** = none **1** = 1 variable **2** = 2 variables ... **8** = 8 variables Indicate the number of variables to be monitored	Size of diagnostic commands data block **0** = No diagnostic **2** = 2 bytes **4** = 4 bytes **8** = 8 bytes	Size of diagnostic states data block **0** = No diagnostic **2** = 2 bytes **4** = 4 bytes **8** = 8 bytes	OFF = Slot disabled ON = Slot enabled
SLOT 2	(see above)	(see above)	(see above)	(see above)
SLOT 3	(see above)	(see above)	(see above)	(see above)
SLOT 4	(see above)	(see above)	(see above)	(see above)
SLOT 5	(see above)	(see above)	(see above)	(see above)

Parameter	Description
PLC -> VM15 DATA BLOCK **[OFF]**	Number of bytes of the acyclic commands data exchange buffer (PLC OUTPUT > VM15 INPUT). **OFF** = acyclic data disabled **4** = 4 byte data buffer **8** = 8 byte data buffer **16** = 16 byte data buffer **32** = 32 byte data buffer
VM15 -> PLC DATA BLOCK **[OFF]**	Number of bytes of the acyclic states data exchange buffer (PLC INPUT < VM15 OUTPUT). **OFF** = acyclic data disabled **4** = 4 byte data buffer **8** = 8 byte data buffer **16** = 16 byte data buffer **32** = 32 byte data buffer

1.3.5. GSD File

The GSD configuration file (BSVM0CE2.GSD) contains the following data.

Attention: the order of appearing of the data block on the PLC program must be the same as the order of appearing in the VM15 slots configuration.

PLC Output → VM15 Input				
Data section	**Reference in GSD File**	**Description**	**No. of bytes**	**Note**
Cyclic	"SYSTEM CMD, 2 BYTE"	System commands	2	Must be present
	"BN CMD, 1-PLANE, 2 BYTE"	Balancer 1 plane commands	2	
	"TD CMD, SEC. A, 3 BYTE"	Touch detector section A commands	3	
	"LG CMD, SEC. A, 3 BYTE"	Gauge section A commands	3	
	"AG-NG CMD, SEC. A, 6 BYTE"	Gauge section A commands	6	
	"MONITOR REQUEST CONFIG, 2 BYTE"	Data monitor commands	2	1 for each function card to be monitored

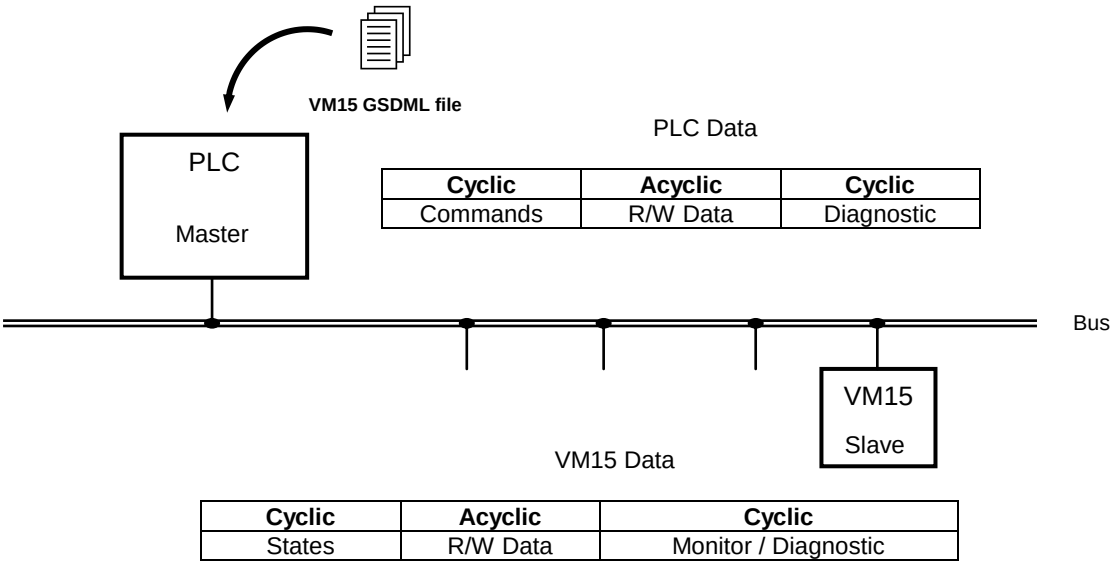
PLC Output → VM15 Input				
Data section	**Reference in GSD File**	**Description**	**No. of bytes**	**Note**
Acyclic	"PLC -> VM15 R/W REQUEST, 7 BYTE"	PLC R/W commands	7	Must be present when acyclic data are enabled
	"PLC -> VM15 DATA BLOCK, 4 BYTE"	Data Write	4	One of the four blocks must be present when acyclic data are enabled
	"PLC -> VM15 DATA BLOCK, 8 BYTE"		8	
	"PLC -> VM15 DATA BLOCK, 16 BYTE"		16	
	"PLC -> VM15 DATA BLOCK, 32 BYTE"		32	
Cyclic	"DIAG CMD, 2 BYTE"	Data Write	2	One of the two blocks must be present for each slot when diagnostic commands are enabled
	"DIAG CMD, 4 BYTE"		4	

PLC Input ← VM15 Output				
Data section	**Reference in GSD File**	**Description**	**No. of bytes**	**Note**
Cyclic	"SYSTEM STATES, 2 BYTE"	System states	2	Must be present
	"BN STATES, 1-PLANE, 3 BYTE"	Balancer 1 plane states	3	
	"TD STATES, SEC. A, 3 BYTE"	Touch detector section A states	3	
	"LG STATES, SEC. A, 4 BYTE"	Gauge section A states	4	
	"AG-NG STATES, SEC. A, 7 BYTE"	Gauge section A states	7	
Acyclic	"VM15 -> PLC R/W RESPONSE, 8 BYTE"	VM15 R/W Response	8	Must be present when acyclic data are enabled
	"VM15 -> PLC DATA BLOCK, 4 BYTE"	R/W Data	4	One of the four blocks must be present when acyclic data are enabled
	"VM15 -> PLC DATA BLOCK, 8 BYTE"		8	
	"VM15 -> PLC DATA BLOCK, 16 BYTE"		16	
	"VM15 -> PLC DATA BLOCK, 32 BYTE"		32	

PLC Input ← VM15 Output				
Data section	**Reference in GSD File**	**Description**	**No. of bytes**	**Note**
Monitor (Cyclic)	"MONITOR DATA VALID, 2 BYTE"	Signaling of monitor data valid for the function card enabled	2	1 for each function card to be monitored
	"INTEGER DATA 2 BYTE"	Integer variable	2	1 for each variable with integer format
	"LONG DATA 4 BYTE"	Long variable	4	1 for each variable with long format
Cyclic	"DIAG STATES, 2 BYTE"	Data Write	2	One of the two blocks must be present for each slot when diagnostic status are enabled
	"DIAG STATES, 4 BYTE"		4	

2. VM15 Profinet

2.1. logical connections



On the master (PLC) is defined the ADDRESS of the VM15 node. This address is checked at start-up. The slave must be configured for the application.

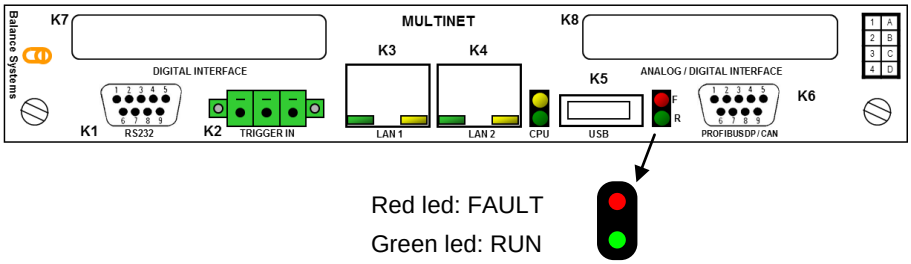
2.2. Profinet device identification

Model name:	VM – Multinet Gateway
Vendor ID:	0314 HEX
Device ID:	0015 HEX
GSDML File name:	GSDML-V2.31-Balance Systems-VM-20151110.xml
Device Type:	PROFINET I/O Device RT – Class A
Protocol Type:	PROFINET I/O RT
OEM:	Balance Systems

2.3. VM15 system configuration

2.3.1. Connection

The VM15 is connected to the fieldbus by a standard RJ45 Profinet connector K3-K4 present on the MULTINET card (p/n 9SHVM15xxMN020).



Multinet [Type MN]			
Type	**ID**	**Name**	**Description**
 RJ45 female	K3	LAN 1	Profinet (Ethernet) port No.1
 RJ45 female	K4	LAN 2	Profinet (Ethernet) port No.2

2.3.2. Hardware configuration

The complete configuration of the VM15 Profinet node is composed of:

No. 5 function cards

- Balancer (BN type)
- Touch detector (TD type)
- Gauge (AG-NG type)

No. 1 Multinet card
No. 1 VM15 control panel or VM15 HMI software

Complex applications with more function cards can be obtained by means of other VM15 nodes connected to the same Profinet net. In these cases each VM15 node is identified by its own IP address assigned by PLC (Master).

IMPORTANT NOTE
On the Multinet card the switch SW2.3 should be setted according to Profinet.
See details on 9UMEN1508-1200 180505 VM15 Multinet Parameter

2.3.3. Function cards configuration

Note: Set the access level "INSTALLER"

Balancer / Touch detector / Gauge

SETUP

INPUTS-OUTPUTS
...
Remote control = [**MN**] or [**MN + DI**] or [**MN or DI**]
...

Parameter	Description
Remote control **[OFF]**	**OFF** = Disabled. **VMBus** = Enabling of VMBus internal communication (i.e. 2 plane balancing performed by 2 balancer cards). With this setup all the digital inputs / outputs are enabled. **MN** = Enabling of communication to the Profinet interface. Attention: With this setting, all digital inputs of the card are disabled (as they are managed via the Profinet protocol) while the outputs continue to work normally. **MN + DI** = Enabling of data communication to the Profinet interface. All digital inputs and outputs of the card are enabled. Digital inputs (commands) by Profinet protocol are not available. **MN or DI** = Enabling of data communication to the Profinet interface. All digital inputs and outputs of the card are enabled. Digital inputs (commands) by Profinet protocol are also available. **A.O.** = Enabling of the analog output data for additional auxiliary card. This option is available on AG and LG cards only.

2.3.4. Multinet Profinet software configuration

Note: Set the access level "INSTALLER"

OPTION

FIELDBUS = ON

SETUP

FIELDBUS APPLICATION
FIELDBUS TYPE = PROFINET (read only, depends on hardware setup)

Parameter	Setup example						
	Type	Config	Interface	Monitor	Diag cmd	Diag sts	Enable
SLOT 1	BN 1	1P	STD	2	0	0	ON
SLOT 2	BN 2	1P	STD	0	0	0	ON
SLOT 3	TD 1	AB	STD	2	0	0	ON
SLOT 4	AG 1	AB	AG	2	2	4	ON
SLOT 5	OFF	---	---	---	---	---	OFF
PLC -> VM15 DATA BLOCK	4						
VM15 -> PLC DATA BLOCK	4						

Parameter	Description		
	Type [OFF]	Config [OFF]	Interface [OFF]
SLOT 1	Enables the specified function card to be managed by profibus network **OFF** = none **BN x** = Balancer BN x (x = 1, 2, 3, 4) **TD x** = Touch detector TD x (x = 1, 2, 3, 4) **LG x** = Gauge LG x (x = 1, 2) AG x = Gauge AG x (x = 1, 2) **NG x** = Gauge NG x (x = 1, 2, 3, 4)	Function card configuration **OFF** = none. Cyclic data are disabled (only cyclic monitor can be used) **1P** = 1 plane **A** = Section A	Type of I/O interface **All slot except AG and NG gauge:** **STD** = default type **For AG and NG gauge slot only:** **LG** = AG compatible with LG gauge **AG** = AG gauge **NG = NG** gauge
SLOT 2	(see above)	(see above)	(see above)
SLOT 3	(see above)	(see above)	(see above)
SLOT 4	(see above)	(see above)	(see above)
SLOT 5	(see above)	(see above)	(see above)

Parameter	Description			
	Monitor [0]	**Diagnostic commands [0]**	**Diagnostic states [0]**	**Enable [OFF]**
SLOT 1	Enable the Data monitor **0** = none **1** = 1 variable **2** = 2 variables ... **8** = 8 variables Indicate the number of variables to be monitored	Size of diagnostic commands data block **0** = No diagnistic **2** = 2 bytes **4** = 4 bytes **8** = 8 bytes	Size of diagnostic states data block **0** = No diagnistic **2** = 2 bytes **4** = 4 bytes **8** = 8 bytes	OFF = Slot disabled ON = Slot enabled
SLOT 2	(see above)	(see above)	(see above)	(see above)
SLOT 3	(see above)	(see above)	(see above)	(see above)
SLOT 4	(see above)	(see above)	(see above)	(see above)
SLOT 5	(see above)	(see above)	(see above)	(see above)

Parameter	Description
PLC -> VM15 DATA BLOCK **[OFF]**	Number of bytes of the acyclic commands data exchange buffer (PLC OUTPUT > VM15 INPUT). **OFF** = acyclic data disabled **4** = 4 byte data buffer **8** = 8 byte data buffer **16** = 16 byte data buffer **32** = 32 byte data buffer
VM15 -> PLC DATA BLOCK **[OFF]**	Number of bytes of the acyclic states data exchange buffer (PLC INPUT < VM15 OUTPUT). **OFF** = acyclic data disabled **4** = 4 byte data buffer **8** = 8 byte data buffer **16** = 16 byte data buffer **32** = 32 byte data buffer

2.3.5. GSDML File

The GSDML configuration file contains the following data.

Attention: the order of appearing of the data block on the PLC program must be the same as the order of appearing in the VM15 slots configuration.

PLC Output → VM15 Input				
Data section	**Reference in GSDML File**	**Description**	**No. of bytes**	**Note**
Cyclic	"SYSTEM CMD, 2 BYTE"	System commands	2	Must be present
	"BN CMD, 1-PLANE, 2 BYTE"	Balancer 1 plane commands	2	
	"TD CMD, SEC. A, 3 BYTE"	Touch detector section A commands	3	
	"LG CMD, SEC. A, 3 BYTE"	Gauge section A commands	3	
	"AG CMD, SEC. A, 6 BYTE"	Gauge section A commands	6	
	"MONITOR REQUEST CONFIG, 2 BYTE"	Data monitor commands	2	1 for each function card to be monitored

PLC Output → VM15 Input				
Data section	**Reference in GSDML File**	**Description**	**No. of bytes**	**Note**
Acyclic	"PLC -> VM15 R/W REQUEST, 7 BYTE"	PLC R/W commands	7	Must be present when acyclic data are enabled
	"PLC -> VM15 DATA BLOCK, 4 BYTE"	Data Write	4	One of the four blocks must be present when acyclic data are enabled
	"PLC -> VM15 DATA BLOCK, 8 BYTE"		8	
	"PLC -> VM15 DATA BLOCK, 16 BYTE"		16	
	"PLC -> VM15 DATA BLOCK, 32 BYTE"		32	
Cyclic	"DIAG CMD, 2 BYTE"	Data Write	2	One of the two blocks must be present for each slot when diagnostic commands are enabled
	"DIAG CMD, 4 BYTE"		4	

PLC Input ← VM15 Output				
Data section	**Reference in GSDML File**	**Description**	**No. of bytes**	**Note**
Cyclic	"SYSTEM STATES, 2 BYTE"	System states	2	Must be present
	"BN STATES, 1-PLANE, 3 BYTE"	Balancer 1 plane states	3	
	"TD STATES, SEC. A, 3 BYTE"	Touch detector section A states	3	
	"LG STATES, SEC. A, 4 BYTE"	Gauge section A states	4	
	"AG STATES, SEC. A, 7 BYTE"	Gauge section A states	7	
Acyclic	"VM15 -> PLC R/W RESPONSE, 8 BYTE"	VM15 R/W Response	8	Must be present when acyclic data are enabled
	"VM15 -> PLC DATA BLOCK, 4 BYTE"	R/W Data	4	One of the four blocks must be present when acyclic data are enabled
	"VM15 -> PLC DATA BLOCK, 8 BYTE"		8	
	"VM15 -> PLC DATA BLOCK, 16 BYTE"		16	
	"VM15 -> PLC DATA BLOCK, 32 BYTE"		32	

PLC Input ← VM15 Output				
Data section	**Reference in GSDML File**	**Description**	**No. of bytes**	**Note**
Monitor (Cyclic)	"MONITOR DATA VALID, 2 BYTE"	Signaling of monitor data valid for the function card enabled	2	1 for each function card to be monitored
	"INTEGER DATA 2 BYTE"	Integer variable	2	1 for each variable with integer format
	"LONG DATA 4 BYTE"	Long variable	4	1 for each variable with long format
Cyclic	"DIAG STATES, 2 BYTE"	Data Write	2	One of the two blocks must be present for each slot when diagnostic status are enabled
	"DIAG STATES, 4 BYTE"		4	

2.3.6. Device outputs behaviour

Output behaviour	
Event	**Description**
Power-on	No function is active until the system receive a command. All digital outputs are in undefined status until the power-on procedure is completed, then are driven in consistent status according with the internal setup.
Connection lost	All the pending commands will be completed in safe mode. All the digital outputs are continously updated, depending on the progress of the internal cycles.
IOPS = bad	Not applicable.

3. VM15 Data structure

Convention:

MASTER	PLC/NCU
SLAVE	VM15
Data:	cyclic (continuous, real-time updated) acyclic (on master demand only)

3.1. Message PLC ➔ VM15

CYCLIC Commands (*)						
SYS	**Function card No. 1**	**Function card No. 2**	**Function card No. 3**	**Function card No. 4**	**Function card No. 5**	**Monitor**

ACYCLIC – Data RW (*)	
Commands	**Data**

CYCLIC – Diagnostic commands (**)				
Function card No. 1	**Function card No. 2**	**Function card No. 3**	**Function card No. 4**	**Function card No. 5**

(*) The number of bytes must be defined at startup
(**) If enabled

3.2. Message PLC ← VM15

CYCLIC states (*)					
SYS	Function card No. 1	Function card No. 2	Function card No. 3	Function card No. 4	Function card No. 5

ACYCLIC – Data (*)	
States	Data

CYCLIC Monitor (*)			
Data valid 1	...	Data valid n	Data – Data queued depending on the number of function card enabled

CYCLIC – Diagnostic states (**)				
Function card No. 1	Function card No. 2	Function card No. 3	Function card No. 4	Function card No. 5

(*)The number of bytes must be defined at startup
(**) If enabled

3.3. System [SYS]

3.3.1. Cyclic details (PLC Output ➔ VM15 Input) - Commands

SYSTEM commands [SYS]		
byte	**bit**	**Description**
0	0	Manual mode lock
0	1	Parameter access lock
0	2	Force automatic mode
0	3	
0	4	
0	5	
0	6	
0	7	Data recording on VM15-HMI: 0 > 1 REC START; 1 > 0 REC STOP A new DataRec file is generated
1	0	
1	1	
1	2	
1	3	
1	4	
1	5	
1	6	
1	7	

3.3.2. Cyclic details (PLC Input ➔ VM15 Output) - States

SYSTEM state [SYS]		
byte	**bit**	**Description**
0	0	System in automatic mode (*)
0	1	System OK
0	2	All function cards are in automatic mode (**)
0	3	System in test mode (*)
0	4	
0	5	
0	6	
0	7	
1	0	Slot 1 enabled
1	1	Slot 2 enabled
1	2	Slot 3 enabled
1	3	Slot 4 enabled
1	4	Slot 5 enabled
1	5	
1	6	
1	7	

Note

(*)The information "System in Automatic Mode" (bit 0.0) is generated by the VM15 control panel. If somebody accesses to the parameters or uses a card in manual mode this bit is cleared.
Attention: if the VM15 control panel is not present or does not recognised the Multinet card, the bit 0.0 is not significant.

(**)The information "All function cards in automatic mode" (bit 0.2) is generated by the Multinet card as logical AND of the function cards present in the VM15 node. The bit 0.2 is suitable in the case in which the VM15 control panel is not present.

3.4. Balancer [BN type – 1 Plane]

3.4.1. Cyclic details (PLC Output ➔ VM15 Input) - Commands

BALANCER commands [BN – 1P]		
byte	**bit**	**Description**
0	0	
0	1	
0	2	
0	3	Run-up filter enable
0	4	
0	5	Data freeze
0	6	NoLink Power ON
0	7	
1	0	Neutral cycle start
1	1	Balancing cycle start
1	2	
1	3	Cycle abort
1	4	
1	5	
1	6	NoLink Power OFF
1	7	

3.4.2. Cyclic details (PLC Input ➔ VM15 Output) - States

BALANCER states [BN – 1P]		
byte	**bit**	**Description**
0	0	
0	1	
0	2	
0	3	
0	4	
0	5	NoLink ON
0	6	Generic alarm
0	7	Automatic mode
1	0	Spindle at nominal rpm
1	1	Spindle over maximum rpm
1	2	Spindle stop
1	3	Manual operation in-progress (e.g pre-balancing)
1	4	
1	5	
1	6	Balancing cycle timeout
1	7	
2	0	Spindle OK (= Neutral position or Unbalance in tolerance)
2	1	Max vibration
2	2	Automatic cycle in progress
2	3	
2	4	
2	5	
2	6	
2	7	Vibration sensor No.1 (pick up 1) not ready

3.5. Pre-Balancer [PB type – 1 Plane]

3.5.1. Cyclic details (PLC Output ➔ VM25 Input) - Commands

PRE-BALANCER commands [PB – 1P]		
byte	**bit**	**Description**
0	0	
0	1	
0	2	
0	3	
0	4	
0	5	
0	6	
0	7	
1	0	
1	1	
1	2	
1	3	
1	4	
1	5	
1	6	
1	7	

(*) Depending on the configuration of the balancer card, this signal maight not be available.
(**) Depending on the configuration of the application, this signal maight not be available.

3.5.2. Cyclic details (PLC Input ➔ VM25 Output) - States

PRE-BALANCER commands [PB – 1P]		
byte	**bit**	**Description**
0	0	
0	1	
0	2	
0	3	
0	4	
0	5	
0	6	Generic alarm
0	7	Automatic mode
1	0	Spindle at nominal rpm
1	1	Spindle over maximum rpm
1	2	Spindle stop
1	3	Manual operation in-progress (e.g pre-balancing)
1	4	
1	5	
1	6	
1	7	
2	0	Spindle OK (Unbalance in tolerance)
2	1	Max vibration
2	2	
2	3	
2	4	
2	5	
2	6	
2	7	Vibration sensor No.1 (pick up 1) not ready

(*) Depending on the configuration of the balancer card, this signal maight not be available.
(**) Depending on the configuration of the application, this signal maight not be available.

3.6. Touch detector [TD type – Section A]

3.6.1. Cyclic details (PLC Output ➔ VM15 Input) – Commands

TOUCH DETECTOR commands [TD – section A]		
byte	**bit**	**Description**
0	0	
0	1	
0	2	
0	3	
0	4	
0	5	
0	6	
0	7	

Section A								**Description**
byte	**bit**							
1	0							Limit 1+2+3 Reset
1	1							
1	2							
1	3							
1	4							
1	5							
1	6							
1	7							
2	0							Part program Select 0
2	1							Part program Select 1
2	2							
2	3							
2	4							
2	5							
2	6							
2	7							Part program change

3.6.2. Cyclic details (PLC Input ← VM15 Output) - States

TOUCH DETECTOR state [TD – section A]		
byte	**bit**	**Description**
0	0	
0	1	
0	2	
0	3	
0	4	Card polling: 0 = No polling; 1 = Polling
0	5	
0	6	Generic alarm
0	7	Automatic mode

Section A								**Description**
byte	**bit**							
1	0							Part program Echo select 0
1	1							Part program Echo select 1
1	2							
1	3							
1	4							
1	5							
1	6							
1	7							Part program Echo select data valid
2	0							Limit 1
2	1							Limit 2
2	2							Limit 3
2	3							
2	4							
2	5							
2	6							Reset in progress
2	7							Cycle in progress

3.7. Touch detector with Envelope [TD type – Section A]

3.7.1. Cyclic details (PLC Output ➔ VM15 Input) – Commands

TOUCH DETECTOR commands [TD – section A]		
byte	**bit**	**Description**
0	0	
0	1	
0	2	
0	3	
0	4	
0	5	
0	6	
0	7	

Section A								**Description**
byte	**bit**							
1	0							Limit 1+2+3 Reset
1	1							
1	2							
1	3							
1	4							
1	5							
1	6							
1	7							
2	0							Part program Select 0
2	1							Part program Select 1
2	2							
2	3							
2	4							
2	5							
2	6							
2	7							Part program change

3.7.2. Cyclic details (PLC Input ← VM15 Output) - States

TOUCH DETECTOR state [TD – section A]	
byte	**bit**
0	0
0	1
0	2
0	3
0	4
0	5
0	6
0	7

Section A								Description
byte	bit							
1	0							Part program Echo select 0
1	1							Part program Echo select 1
1	2							
1	3							
1	4							
1	5							
1	6							
1	7							Part program Echo select data valid
2	0							Limit 1
2	1							Limit 2
2	2							Limit 3
2	3							
2	4							
2	5							
2	6							Reset in progress
2	7							Cycle in progress

3.7.3. Diagnostic cyclic details (PLC Output ➔ VM25 Input) – Commands

TOUCH DETECTOR diagnostic commands [TD]		
byte	**bit**	**Description**
0	0	ENV: Start
0	1	ENV: Stop
0	2	ENV: Learning start/stop
0	3	ENV: Autostart (EXT)
0	4	ENV: Master clear
0	5	
0	6	
0	7	
1	0	
1	1	
1	2	
1	3	
1	4	
1	5	
1	6	
1	7	

3.7.4. Diagnostic cyclic details (PLC Input ➔ VM25 Output) - States

TOUCH DETECTOR diagnostic states [TD]		
byte	**bit**	**Description**
0	0	ENV: process over tollerance
0	1	ENV: process below tollerance
0	2	ENV: zone over tolerance
0	3	ENV: zone below tolerance
0	4	ENV: Ip over crash
0	5	ENV: Ip over max
0	6	ENV: Ip below min
0	7	ENV: process completed
1	0	ENV: cycle in progress
1	1	ENV: cycle stopped
1	2	ENV: learning in progress
1	3	ENV: cycle duration learning
1	4	ENV: process timeout
1	5	ENV: no stored master
1	6	ENV: autostart timeout
1	7	ENV: No stored time duration
2	0	
2	1	
2	2	
2	3	
2	4	
2	5	
2	6	
2	7	
3	0	
3	1	
3	2	
3	3	
3	4	
3	5	
3	6	
3	7	

3.8. Gauge with AG interface [AG type – Section A]

3.8.1. Cyclic details (PLC Output ➔ VM15 Input) – Commands

GAUGE commands [AG – Section A]				
byte		bit		Description
0		0		
0		1		
0		2		
0		3		
0		4		
0		5		
0		6		
0		7		
1		-		Coolant temperature – MSB (short integer with resolution 0.1 °C)
2		-		Coolant temperature – LSB
Section A				Description
byte	bit			
3	0			Cycle Start/Enable
3	1			Zero
3	2			Retraction
3	3			Reset zero
3	4			Hold dimension (data hold)
3	5			
3	6			
3	7			
4	0			Part program Select 0
4	1			Part program Select 1
4	2			Part program Select 2
4	3			Part program Select 3
4	4			Offset + (1 step increment)
4	5			Offset – (1 step decrement)
4	6			Offset reset (Offset = 0)
4	7			Part program change
5	0			
5	1			
5	2			
5	3			
5	4			
5	5			
5	6			
5	7			

3.8.2. Cyclic details (PLC Input ← VM15 Output) - States

GAUGE state [AG – Section A]							
byte		Bit		Description			
0		0		Sync 1 Error			
0		1		Sync 2 Error			
0		2					
0		3					
0		4		Card polling: 0 = No polling; 1 = Polling			
0		5					
0		6					
0		7		Automatic mode			
Section A				Description			
byte	bit			In-Process	Post-Process	Post-Process Roundness	Pre-Process
1	0			Command A	Reject -		
1	1			Command 0	Compensation -		
1	2			Command 1	Good		
1	3			Command 2	Compensation +		
1	4			Command 3	Reject +		
1	5			Command 4			
1	6			Spark Out			
1	7				Data valid	Data Valid	
2	0			Threshold 1		Threshold 1	
2	1			Threshold 2		Threshold 2	
2	2			Threshold 3		Threshold 3	
2	3						
2	4						
2	5						
2	6						
2	7						
3	0			Start cycle delay expired			
3	1						
3	2						
3	3						
3	4			Overrange			
3	5			Zero in Progress			
3	6			Gauging in progress			
3	7			Hold dimension active (data hold activated)			
4	0			Part program Echo select 0			
4	1			Part program Echo select 1			
4	2			Part program Echo select 2			
4	3			Part program Echo select 3			
4	4			Part program Echo select - Data Valid			
4	5			Retraction OK			
4	6			Generic Alarm			
4	7						
5	0						
5	1						
5	2						
5	3						
5	4						
5	5						
5	6						
5	7						
6	-			Error code (see table below)			

Byte 6 – ERROR CODE Table			
Code		Description	Action
hex	dec		
00	0	No errors	
01	1	Fine gauge heads retracted	Remove retraction
02	2	No slide-in	
03	3	No slide-out	
04	4	Traverse movement in progress	

3.9. Gauge with NG interface [NG type – Section A]

3.9.1. Cyclic details (PLC Output ➔ VM15 Input) – Commands

GAUGE commands [NG – Section A]				
byte		bit		Description
0		0		
0		1		
0		2		
0		3		
0		4		
0		5		
0		6		
0		7		
1		-		Coolant temperature – MSB (short integer with resolution 0.1 °C)
2		-		Coolant temperature - LSB
Section A				Description
byte	bit			
3	0			Cycle Start/Enable
3	1			Zero
3	2			Retraction
3	3			Reset zero
3	4			Hold dimension (data hold)
3	5			Offset + (1 step increment)
3	6			Offset – (1 step decrement)
3	7			Offset reset (Offset = 0)
4	0			Part program Select 0
4	1			Part program Select 1
4	2			Part program Select 2
4	3			
4	4			
4	5			
4	6			
4	7			Part program change
5	0			
5	1			
5	2			
5	3			
5	4			
5	5			
5	6			
5	7			

3.9.2. Cyclic details (PLC Input ← VM15 Output) - States

GAUGE state [NG – Section A]							
byte		Bit		Description			
0		0		Sync 1 Error			
0		1		Sync 2 Error			
0		2					
0		3					
0		4		Card polling: 0 = No polling; 1 = Polling			
0		5					
0		6					
0		7		Automatic mode			
Section A				Description			
byte	bit			In-Process	Post-Process	Post-Process Roundness	Pre-Process
1	0			Command A	Reject -		Reject -
1	1			Command 0	Compensation -		
1	2			Command 1	Good		Good
1	3			Command 2	Compensation +		
1	4			Command 3	Reject +		Reject +
1	5			Command 4	Compensation lower --		
1	6			Spark Out	Compensation upper ++		
1	7				Data valid	Data Valid	Data valid
2	0			Threshold 1		Threshold 1	
2	1			Threshold 2		Threshold 2	
2	2			Threshold 3		Threshold 3	
2	3						
2	4						
2	5						
2	6						
2	7				Timeout data valid		
3	0			Start cycle delay expired			
3	1			Retraction OK			
3	2			Generic Alarm			
3	3			Over Max			
3	4			Overrange			
3	5			Zero in Progress			
3	6			Gauging in progress			
3	7			Hold dimension active (data hold activated)			
4	0			Part program Echo select 0			
4	1			Part program Echo select 1			
4	2			Part program Echo select 2			
4	3						
4	4						
4	5						
4	6						
4	7			Part program Echo select - Data Valid			
5	0			G2 Used in Section Part Program			
5	1			G3 Used in Section Part Program			
5	2			G4 Used in Section Part Program			
5	3						
5	4						
5	5						
5	6						
5	7						
6	-			Error code (see table below)			

Byte 6 – ERROR CODE Table			
Code		Description	Action
hex	dec		
00	0	No errors	
01	1	Fine gauge heads retracted	Remove retraction
02	2	No slide-in	
03	3	No slide-out	
04	4	Traverse movement in progress	

3.10. Gauge [AG type – Diagnostic]

3.10.1. Cyclic details (PLC Output ➔ VM15 Input) – Commands

GAUGE diagnostic commands [AG-NG]		
byte	**bit**	**Description**
0	0	G2 retraction
0	1	G3 retraction
0	2	G4 retraction
0	3	
0	4	
0	5	
0	6	
0	7	
1	0	
1	1	
1	2	
1	3	
1	4	
1	5	
1	6	
1	7	

3.10.2. Cyclic details (PLC Input ➔ VM15 Output) - States

GAUGE diagnostic states [AG-NG]		
byte	**bit**	**Description**
0	0	G2 Lower overrange
0	1	G3 Lower overrange
0	2	G4 Lower overrange
0	3	
0	4	G2 Upper overrange
0	5	G3 Upper overrange
0	6	G4 Upper overrange
0	7	
1	0	G2 Min dimension
1	1	G3 Min dimension
1	2	G4 Min dimension
1	3	
1	4	G2 Max dimension
1	5	G3 Max dimension
1	6	G4 Max dimension
1	7	
2	0	G2 Fault / Error
2	1	G3 Fault / Error
2	2	G4 Fault / Error
2	3	
2	4	G2 Retracted
2	5	G3 Retracted
2	6	G4 Retracted
2	7	
3	0	
3	1	
3	2	
3	3	
3	4	
3	5	
3	6	
3	7	

3.11. Gauge [NG type – Diagnostic]

3.11.1. Cyclic details (PLC Output ➔ VM15 Input) – Commands

GAUGE diagnostic commands [AG-NG]		
byte	**bit**	**Description**
0	0	G2 retraction
0	1	G3 retraction
0	2	G4 retraction
0	3	
0	4	ASK rd Offset A
0	5	
0	6	WR Offset A
0	7	
1	0	
1	1	
1	2	
1	3	
1	4	
1	5	
1	6	
1	7	
2		Offset A (HI PART)
3		Offset A (LO PART)
4		
5		
6		
7		

3.11.2. Cyclic details (PLC Input ← VM15 Output) - States

GAUGE diagnostic states [AG-NG]		
byte	**bit**	**Description**
0	0	G2 Lower overrange
0	1	G3 Lower overrange
0	2	G4 Lower overrange
0	3	
0	4	G2 Upper overrange
0	5	G3 Upper overrange
0	6	G4 Upper overrange
0	7	
1	0	G2 Min dimension
1	1	G3 Min dimension
1	2	G4 Min dimension
1	3	
1	4	G2 Max dimension
1	5	G3 Max dimension
1	6	G4 Max dimension
1	7	
2	0	G2 Fault / Error
2	1	G3 Fault / Error
2	2	G4 Fault / Error
2	3	
2	4	G2 Retracted
2	5	G3 Retracted
2	6	G4 Retracted
2	7	
3	0	DV Offset A
3	1	
3	2	
3	3	
3	4	
3	5	
3	6	
3	7	
4		Offset A (HI PART)
5		Offset A (LO PART)
6		
7		

3.12. Cyclic monitor

3.12.1. Commands (PLC Output ➔ VM15 Input)

The data monitor commands must be used to define which variables the VM15 system has to send to the PLC/NCU.

For each function card enabled are reserved 2 command byte which must be managed bit to bit. The number of bit setted to “1” must match the number of enabled monitor variables (see paragraph 1.2.4)

Monitor commands for Balancer [BN]		
byte	**bit**	**Description**
0	0	0: disabled 1: Plane A - Unbalance magnitude
0	1	0: disabled 1: Plane A - Unbalance phase
0	2	
0	3	
0	4	0: disabled 1: Spindle rotation speed
0	5	
0	6	
0	7	
1	0	
1	1	
1	2	
1	3	
1	4	
1	5	
1	6	
1	7	

Monitor commands for Touch detector [TD]		
byte	**bit**	**Descrizione**
0	0	0: disabled 1: Variable V1
0	1	0: disabled 1: Variable V2
0	2	
0	3	
0	4	
0	5	
0	6	
0	7	
1	0	0: disabled 1: Power section A
1	1	
1	2	
1	3	
1	4	
1	5	
1	6	
1	7	

Monitor commands for Gauge [AG-NG]		
byte	**bit**	**Description**
0	0	0: disabled 1: Dimension section A
0	1	
0	2	0: disabled 1: Workpiece 1 rotation speed
0	3	
0	4	
0	5	
0	6	
0	7	
1	0	0: disabled 1: Transducer G2
1	1	0: disabled 1: Transducer G3
1	2	0: disabled 1: Transducer G4
1	3	
1	4	
1	5	
1	6	
1	7	

3.12.2. Data (PLC Input ← VM15 Output)

The data monitor message is composed by:

- A group of “Monitor data valid” for each function card enabled
- A group of data queued in order to respect the sequence of the enabled function cards, the number of variables for each function card, the variables format.

Note 1 It is not necessary to activate the data monitor for all the function cards.

Note 2 The contents of the monitor cyclic data can be run-time changed at run-time by using the cyclic monitor command section (see paragraph 2.3.5).

Note 3 For values (example: Temperature, % Compensation capacity, etc.) which are not true or usable the data content will be filled as 0xffff.

	CYCLIC Monitor							
	Data valid 1	**..**	**Data valid n**	**Data – Data queued depending on the number of function card enabled**				
Byte	0	..	...	...	...	...	...	...

BALANCER Monitor data valid [BN]		
byte	**bit**	**Description**
0	0	0: not valid 1: Plane A - Unbalance magnitude
0	1	0: not valid 1: Plane A - Unbalance phase
0	2	
0	3	
0	4	0: not valid 1: Spindle rotation speed
0	5	
0	6	
0	7	
1	0	
1	1	
1	2	
1	3	
1	4	
1	5	
1	6	
1	7	

TOUCH DETECTOR Monitor data valid [TD]		
byte	**bit**	**Description**
0	0	0: not valid 1: Variable V1
0	1	0: not valid 1: Variable V2
0	2	
0	3	
0	4	
0	5	
0	6	
0	7	
1	0	0: not valid 1: Power section A
1	1	
1	2	
1	3	
1	4	
1	5	
1	6	
1	7	

GAUGE Monitor data valid [AG-NG]		
byte	**bit**	**Description**
0	0	0: not valid 1: Dimension section A
0	1	
0	2	0: not valid 1: Workpiece 1 rotation speed
0	3	
0	4	
0	5	
0	6	
0	7	
1	0	0: not valid 1: Transducer G2
1	1	0: not valid 1: Transducer G3
1	2	0: not valid 1: Transducer G4
1	3	
1	4	
1	5	
1	6	
1	7	

Format of the data monitor variables for each function card

BALANCER Variables format [BN]			
Variable	**Format**		
Plane A – unbalance magnitude	Integer 2 byte	Byte 0 Hi	Byte 1 Lo
Plane A – unbalance phase	Integer 2 byte	Byte 0 Hi	Byte 1 Lo

TOUCH DETECTOR Variables format [TD]			
Variable	**Format**		
Variable V1	Integer 2 byte	Byte 0 Hi	Byte 1 Lo
Variable V2	Integer 2 byte	Byte 0 Hi	Byte 1 Lo
Power section A	Integer 2 byte	Byte 0 Hi	Byte 1 Lo

GAUGE Variables format [AG-NG]					
Variable	**Format**				
Dimension section A	Long 4 byte	Byte 0 Hi	Byte 1	Byte 2	Byte 3 Lo
Dimension section A	Long 4 byte	Byte 0 Hi	Byte 1	Byte 2	Byte 3 Lo
Workhead 1 rotation speed	Long 4 byte	Byte 0 Hi	Byte 1	Byte 2	Byte 3 Lo
Transducer G2	Long 4 byte	Byte 0 Hi	Byte 1	Byte 2	Byte 3 Lo
Transducer G3	Long 4 byte	Byte 0 Hi	Byte 1	Byte 2	Byte 3 Lo
Transducer G4	Long 4 byte	Byte 0 Hi	Byte 1	Byte 2	Byte 3 Lo

3.13. Acyclic data

Access mode with VM15 CN tables (see document “9UMEN1507-1200 YYMMDD Remote Programming v120 En.pdf”).

Write VM15 parameters

(PLC ➔ VM15) WRITE request:

<CMD>	<ADR>	<HTAB 16bit>	<LTAB 16bit>	<HPAR 16bit>	<LPAR 16bit>	<N>	<VAL1>	..	<VALn>

(VM15 ➔ PLC) VM15 acknowledge:

<RESP>	<ERR>	<ADR>	<HTAB 16bit>	<LTAB 16bit>	<HPAR 16bit>	<LPAR 16bit>	<N>

Read VM15 parameters

(PLC ➔ VM15) READ request:

<CMD>	<ADR>	<HTAB 16bit>	<LTAB 16bit>	<HPAR 16bit>	<LPAR 16bit>	<N>

(VM15 ➔ PLC) VM15 acknowledge:

<RESP>	<ERR>	<ADR>	<HTAB 16bit>	<LTAB 16bit>	<HPAR 16bit>	<LPAR 16bit>	<N>	<VAL1>	..	<VALn>

where:

<CMD> Command (see table below)
<ADR> Function Card address

<HTAB16bit> Parameter table address – byte Hi
<LTAB16bit> Parameter table address – byte Lo

<HPAR16bit> First read/write Parameter ID code (address) – byte Hi
<LPAR16bit> First read/write Parameter ID code (address) – byte Lo

<N> Consecutive number of bytes to read / write

<VAL1> First byte value
<VALn> Last byte value
<RESP> Response to command (normally echo <CMD>)
<ERR> Error code

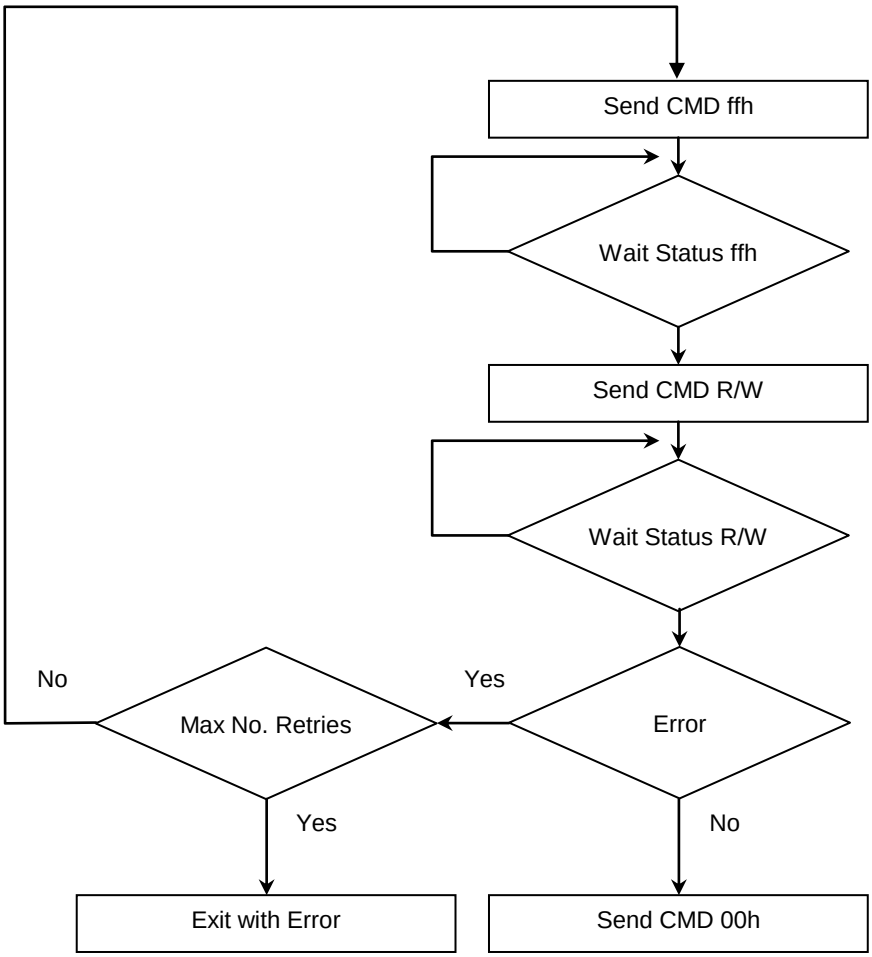
IMPORTANT NOTE:
To warrant the consistency of the message the <CMD> field must be filled as last in the order.

COMMANDS Table <CMD>		
Code		**Description**
hex	**dec**	
00	0	No command
ff	255	New command enable
11	17	Write
10	16	Read

ERROR CODE Table <ERR>				
Code		**Description**	**Causes**	**Action**
hex	**dec**			
00	0	No errors	--	--
01	1	Communication busy	The communication bus is busy due to other tasks	Repeat the command
02	2	VM15 protocol timeout	The function card address is incorrect	Use a correct address
			If the VM15 system is operating without neither VM15 panel nor VM15 HMI application: ▪ The addressed function card is faulty ▪ One or more function cards are faulty and lock the communication bus	Check and remove or change the faulty cards
			If the system is configured to operate with more than one control unit: the physical connection (cables) is interruptted.	Check the physical connection (cables) between the control units
			If the system is using a VM15 Panel: the system configuration is incorrect	Check if the Multinet card is included in the system configuration. If not, enable it and restart the VM15 system.
			If the system is using a VM15 Panel: the communication between the panel and the control unit is faulty / interrupted	Restart the VM15 system. If the error persist: ▪ Check the physiscal connection (cables & connectors) ▪ Search for possible faulty function card(s)
			If the system is using a VM15 HMI application **see the cases with VM15 panel**	**NOTE** to restart the VM15 system: ▪ Switch on the control unit as first ▪ Lauch the VM15 HMI application

03	3	VM15 System NOT in automatic mode	One or more function card is operating in MANUAL MODE	Switch all the cards in automatic mode by using the command on the control panel VM15 or VM15 HMI
				Force the system command “AUTOMATIC MODE” by Profibus / Profinet interface
			The system is in SERVICE MODE	Switch the system in automatic mode
04	4	Number of data > max	In the request, the number of bytes of the acyclic data exceed the size of the data buffer	Correct the request or increase the size of the data buffer in the configuration of acyclic data
0c	12	Unknown slave address	The address of the selected function card is unknown	Use a proper card address
			The address of the selected function card is correct, but the card is not included in the control unit or is not enabled in the system configuration	▪ Insert the function card in the VM15 rack ▪ Enable the function card in the system configuration
0d	13	Unknown table address	The address of the selected table is unknown	Use a proper table address
0f	15	VM15 protocol error	a read/write request to a device is pending and an internal protocol error is detected, due to some mismatch	Implement a retry procedure

TYPICAL R/W DATA DIAGRAM FROM PLC TO VM15



Example

Write the OFFSET value at 0.0320 mm on Gauge 1 – Section A – Part Program 1.

NOTES:

- See "9UMEN1507-1200 YYMMDD Remote Programming v120 En.pdf" for parameters code, format, function card bus address and error codes. Each shown value has to be converted in hexadecimal format.

- Each parameter value should be written as integer, thus offset 0.0320 mm should be written as 320. Since the offset parameter is an integer with 16 bits (2 bytes: HI byte and LOW byte), its value in hex code is obtained as follows:

  offset = 0.0320 mm → 320 → Hex(320) → 01 40

  Consequently high byte OFFSET to be written will be: 01
  low byte OFFSET to be written will be: 40

Data to be sent (from CNC Master device to VM15):

11	30	00	01	00	10	02	01	40

where:

11	write command,	
30	hex equivalent to decimal 48:	Gauge 1 address
00	hex equivalent to decimal 0:	Section A table address - byte Hi
01	hex equivalent to decimal 1:	Section A table address - byte Lo
00	hex equivalent to decimal 0:	Parameter “OFFSET” address - byte Hi
10	hex equivalent to decimal 16:	Parameter “OFFSET” address - byte Lo
02	hex equivalent to decimal 2:	total bytes to write
01	hex equivalent to decimal 1:	OFFSET value byte Hi (0.0320 mm)
40	hex equivalent to decimal 64:	OFFSET value byte Lo (0.0320 mm)

Acknowledge data sent by VM15 system:

11	00	30	00	01	00	10	02

where:

11	write command,	
00	error code,	00 = no error,
30	hex equivalent to decimal 48:	Gauge 1 address
00	hex equivalent to decimal 0:	Section A table address - byte Hi
01	hex equivalent to decimal 1:	Section A table address - byte Lo
00	hex equivalent to decimal 0:	Parameter “OFFSET” address - byte Hi
10	hex equivalent to decimal 16:	Parameter “OFFSET” address - byte Lo
02	hex equivalent to decimal 2:	total bytes to write

4. Example of data memory map on PLC

In the example below the VM15 system's parameters of the Profibus setup are indicated in the table.

NOTE: In the example the Gauge card is working as "In-Process".

Parameter	PROFIBUS Setup example						
	Type	Config	Interface	Monitor	Diag cmd	Diag sts	Enable
Slave address	5						
SLOT 1	BN 1	1P	STD	2	0	0	ON
SLOT 2	TD 1	A	STD	2	0	0	ON
SLOT 3	AG 1	A	LG	2	0	0	ON
SLOT 4	OFF	OFF	OFF	0	0	0	OFF
SLOT 5	OFF	OFF	OFF	0	0	0	OFF
PLC -> VM15 DATA BLOCK	4						
VM15 -> PLC DATA BLOCK	4						

Parameter	PROFINET Setup example						
	Type	Config	Interface	Monitor	Diag cmd	Diag sts	Enable
SLOT 1	BN 1	1P	STD	2	0	0	ON
SLOT 2	TD 1	A	STD	2	0	0	ON
SLOT 3	AG 1	A	LG	1	0	0	ON
SLOT 4	OFF	---	---	---	---	---	OFF
SLOT 5	OFF	---	---	---	---	---	OFF
PLC -> VM15 DATA BLOCK	4						
VM15 -> PLC DATA BLOCK	4						

4.1. Data memory map PLC➔ VM15

NOTE: The columns “PLC Data” in the following tables indicate a memory area of the PLC

PLC Data	Byte	Function		Bit / Byte							
				7	6	5	4	3	2	1	0
Cyclic commands											
D4200	0	System		--	--	--	--	--	Force Auto	Parameter lock	Manual lock
D4201	1			--	--	--	--	--	--	--	--
D4202	2	Balancer 1 BN 1P		--	NoLink ON	Data freeze		Run-up	PP change	PP Select 1	PP Select 0
D4203	3			--	--	--	--	Abort	--	Start Balance	Start Neutral
D4206	4	Touch detector 1		--	--	--	--	--	Setup change	Setup select 1	Setup Select 0
D4207	5		A	--	--	--	--	--	--	--	Reset Limits A
D4208	6			PP change	--	--	--	--	PP Select 2	PP Select 1	PP Select 0
D4209	7	Gauge 1 A		--	--	--	--	--	--	--	--
D4210	8		A	--	--	--	--	--	Retraction	Zero	Cycle Start / Enb
D4211	9			PP change	--	--	--	PP Select 3	PP Select 2	PP Select 1	PP Select 0
D4212	10	Monitor Balancer 1 BN 1P		0	0	0	Rotation speed 1	0	0	Unbalance phase 0	Unbalance magnitude 1
D4213	11			0	0	0	0	0	0	0	0
D4214	12	Monitor Touch detector 1 A		0	0	0	0	0	0	Variable V2 0	Variable V1 1
D4215	13										
D4216	14	Monitor Gauge 1 A		0	0	0	0	0	0	0	Dimension A 1
D4217	15										

PLC Data	Byte	Function	Bit / Byte							
			7	6	5	4	3	2	1	0
Acyclic commands										
D4216	16	<CMD>	Command							
D4217	17	<ADR>	Function card address							
D4218	18	<TABH 16bit>	Parameter table address - byte Hi							
D4219	19	<TABL 16bit>	Parameter table address - byte Lo							
D4220	20	<PARH 16bit>	First R/W parameter ID code (address) - byte Hi							
D4221	21	<PARL 16bit>	First R/W parameter ID code (address) - byte Lo							
D4222	22	<No. Byte>	Consecutive number of bytes to read / write (max 4 in this example)							
D4223	23	<Data 0>	Data – Byte 0							
D4224	24	<Data 1>	Data – Byte 1							
D4225	25	<Data 2>	Data – Byte 2							
D4226	26	<Data 3>	Data – Byte 3							

4.2. Data memory map PLC🡐 VM15

NOTE: The columns “PLC Data” in the following tables indicate a memory area of the PLC

PLC Data	Byte	Function		Bit / Byte							
				7	6	5	4	3	2	1	0
Cyclic states											
D4300	0	System		--	--	--	--	--	Cards Automatic	System OK	Automatic mode
D4301	1			--	--	--	--	--	--	--	--
D4302	2	Balancer 1 BN 1P		Auto mode	Alarm	Nolink ON	--	--	Echo Data Valid	Echo Select 1	Echo Select 0
D4303	3			--	--	--	--	--	RPM=0	RPM Max	Nominal RPM
D4304	4			Pickup KO	Aux Pickup KO	Nutral cycle needed	Max capacity reached	--	Cycle in progress	Max Vibration	Spindle OK
D4305	5	Touch detector 1 A		Auto mode	Alarm	--	--	--	--	--	--
D4306	6		A	Echo Data Valid	--	--	--	--	Echo Select 2	Echo Select 1	Echo Select 0
D4307	7			Cycle in progress	Reset in progress	--	--	--	Limit 3	Limit 2	Limit 1
D4308	8	Gauge 1 A		Auto mode	--	--	--	--	--	Sync 2 error	Sync 1 error
D4309	9		A	--	Roundness OK	--	--	Command 4	Command 3	Command 2	Command 1
D4310	10			--	Gauging in progress	Zeroing executed	Overange	--	--	--	Delay expired
D4311	11			--	Alarm	Ratraction OK	Echo Data Valid	Echo Select 3	Echo Select 2	Echo Select 1	Echo Select 0

PLC Data	Byte	Function	Bit / Byte							
			7	6	5	4	3	2	1	0
Acyclic Data										
D4312	12	<CMD>	Command							
D4313	13	<ERR>	Error code							
D4314	14	<ADR>	Function card address							
D4215	15	<TABH 16bit>	Parameter table address - byte Hi							
D4216	16	<TABL 16bit>	Parameter table address - byte Lo							
D4317	17	<PARH 16bit>	First R/W parameter ID code (address) - byte Hi							
D4318	18	<PARL 16bit>	First R/W parameter ID code (address) - byte Lo							
D4319	19	<No.Byte>	Consecutive number of bytes red / written (max 4 in this example)							
D4320	20	<Data 0>	Data – Byte 0							
D4321	21	<Data 1>	Data – Byte 1							
D4322	22	<Data 2>	Data – Byte 2							
D4323	23	<Data 3>	Data – Byte 3							

PLC Data	Byte	Function	Bit / Byte							
			7	6	5	4	3	2	1	0
Cyclic Monitor Data										
D4324	24	Monitor data valid Balancer 1 BN 1P	0	0	0	Rotation speed 1	0	0	Unbalance phase 0	Unbalance magnitude 1
D4325	25		0	0	0	0	0	0	0	0
D4326	26	Monitor data valid Touch detector 1 A	0	0	0	0	0	0	Variable V2 0	Variable V1 1
D4327	27		0	0	0	0	0	0	0	0
D4328	28	Monitor data valid Gauge 1 A	0	0	0	0	0	0	0	Dimension A 1
D4329	29		0	0	0	0	0	Transducer G4 1	Transducer G3 0	Transducer G2 0
D4330	30	Balancer 1 BN 1P	<Unbalance magnitude> byte 0 high							
D4331	31		<Unbalance magnitude> byte 1 low							
D4332	32		<Rotation speed> byte 0 high							
D4333	33		<Rotation speed> byte 1 low							
D4334	34	Touch detector 1 A	<Variable V1> byte 0 high							
D4335	35		<Variable V1> byte 1 low							
D4336	36	Gauge 1 A	<Dimension A> byte 0 high							
D4337	37		<Dimension A> byte 1							
D4338	38		<Dimension A> byte 2							
D4339	39		<Dimension A> byte 3 low							
D4340	40		<Transducer G4> byte 0 high							
D4341	41		<Transducer G4> byte 1							
D4342	42		<Transducer G4> byte 2							
D4343	43		<Transducer G4> byte 3 low							