



Company Overview

Norden Machinery AB

13/03/2017

NORDEN

a coesia company

Norden Machinery AB, a company of Coesia group

About us

History

Facts & Figures

Footprint

The Team

Companies

COESIA

Advanced Automated Machinery and Materials

Consumer Goods

Tobacco

Industrial Process Solutions

Precision Gears

ACMA

Packaging machinery wrapping and filling for food, tea & coffee, personal & home care

R.A JONES

Packaging machinery for food and consumer goods

G.D

Making and packing lines for the tobacco industry

HAPA

Printing systems for packaging lines

FLEXLINK

Automated production flow solutions & components

CIMA

Gear transmissions and power trains for high-performance applications

NORDEN

Tube filling systems for all speeds and applications

CITUS KALIX

Lipstick, tube, cream fillers and cartoning machines for cosmetics

SASIB

Making and packing lines for the tobacco industry

SACMO

Service and tailor-made packaging solutions

ADMV

Feeding and assembling solutions for packaging lines

GDM

Production lines for hygiene disposables

IPI

Aseptic filling machines and multilayer carton packaging material.

VOLPAK

Horizontal form-fill-and-seal for food, beverage and chemicals

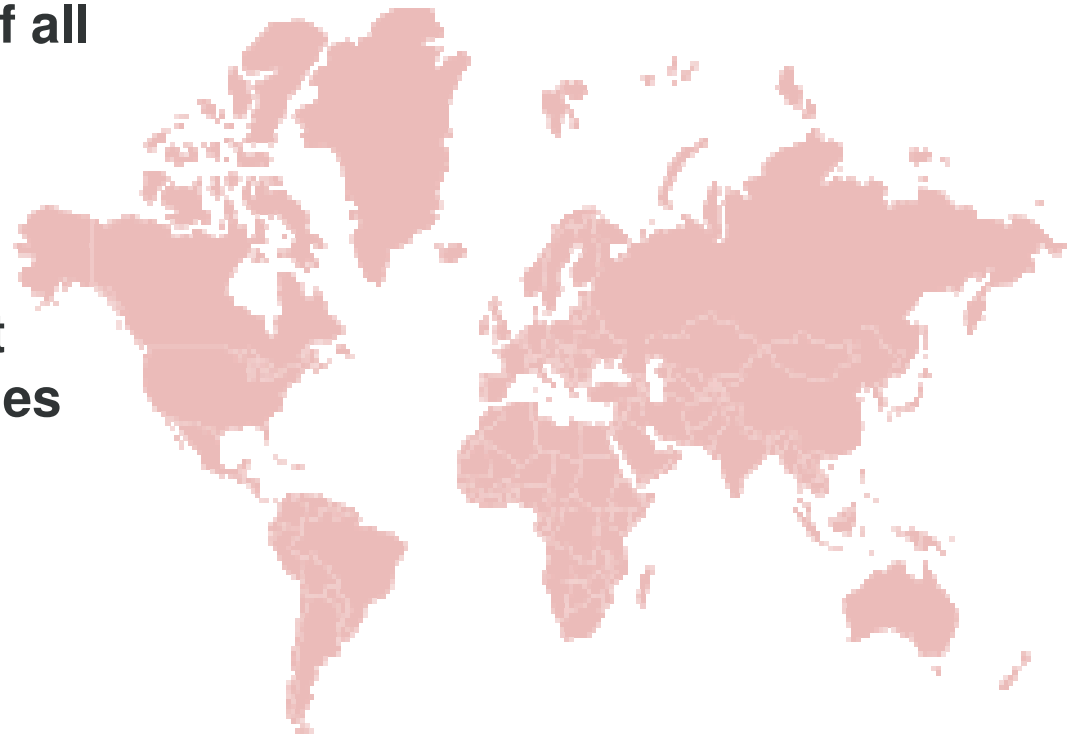
Norden facts and figures

- 260 employed in Kalmar (Sweden)
- First tube filling machine delivered 1934
- 8000 machines supplied in total
- 130 - 150 machines delivered every year



Our Customers

- **Worldwide operation, 98% of all machines are exported**
- **1400 active customers in 60 countries**
- **Builder of the worlds fastest tube filling and cartoning lines that produces up to 1000 units/minute**



Norden products

Equipment to fill, seal and handle collapsible tubes of all materials and sizes



Nordenpac 3002

- Tube filling machines
- Cartoning machines
- Tray packing systems
- Feeding equipment
- After Sales Products



Nordenmatic 602



Norden Machinery Automation system

2017

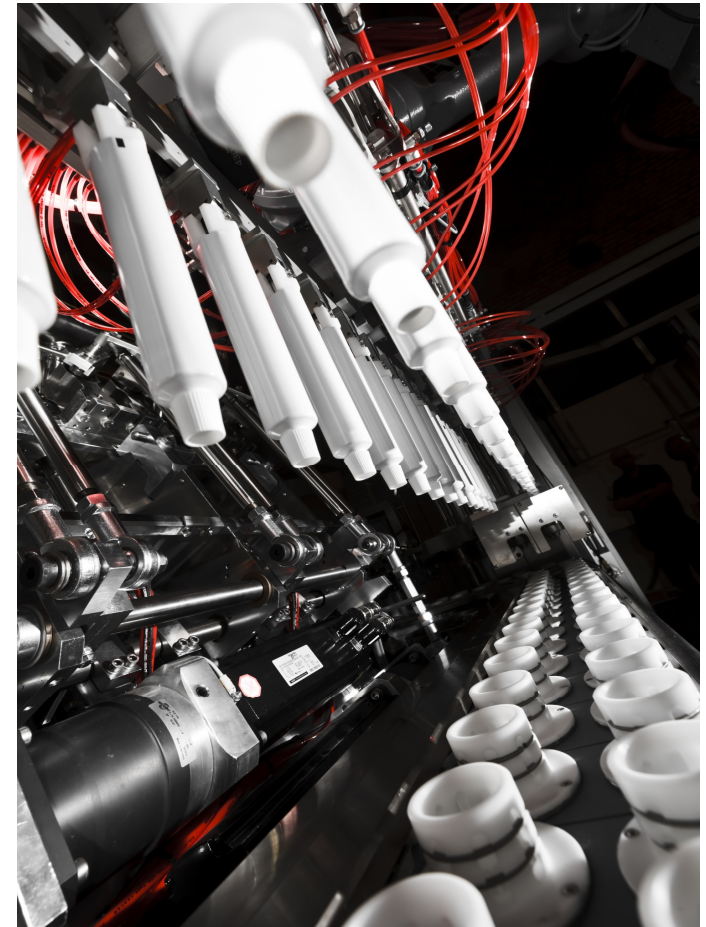
13/03/2017

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Norden Automation facts and figures

- **25-30 people working with electrical design, IT, programming and service.**
- **Beginning of the 2000`s started building the EasyWare concept based ELAU PLC motion controller, Beijer Electronics HMI and ABB robotic controller.**
- **2009 started building the EasyWare Gen II concept based on Schneider Electric PacDrive 3, Beijer Electronics HMI and ABB robotic controller.**



Norden Automation facts and figures

- **Implementation of the PackML status in the machine HMI around year 2002.**
- **Started using OPC communication for machine to customer MES connections in mid 2000`s.**
- **Implementation of the ISA88-Technical Report TR88.00.02 in year 2014.**
- **Presentation of the Norden Machinery Industry 4.0 solution on the Interpack show 2017.**



Norden EasyWare PackML HMI interface standard

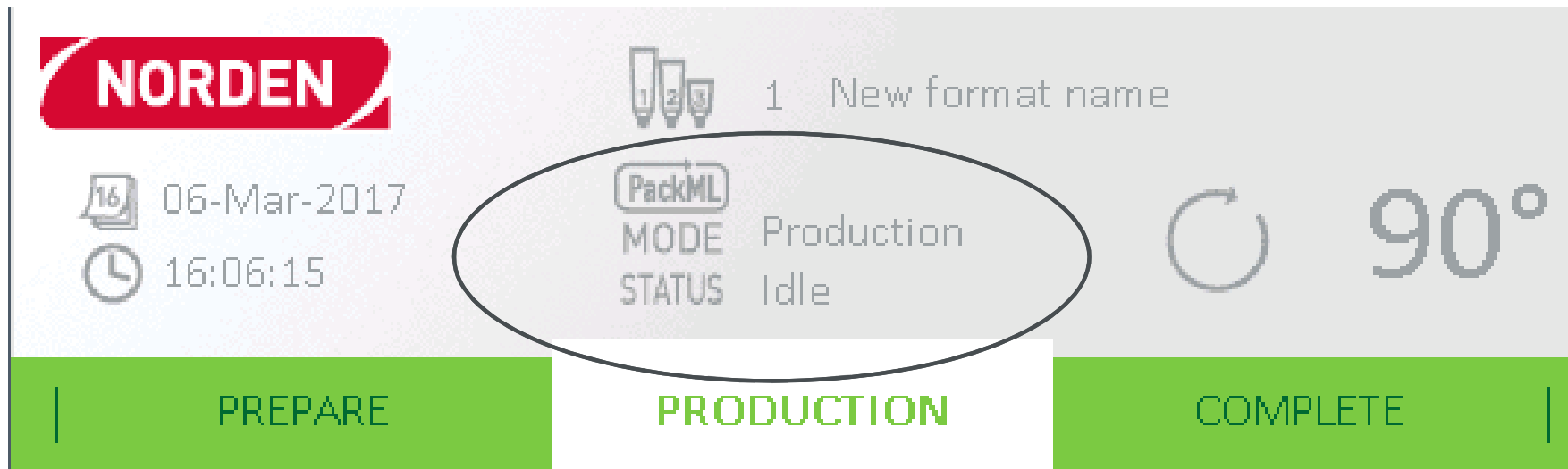
The screenshot displays the Norden EasyWare PackML HMI interface. At the top, the 'NORDEN' logo is on the left, and a 'PackML' status indicator is in the center. The date and time are shown as '06-Mar-2017 15:55:28'. The current mode is 'Production' and the status is 'Idle'. A large '90°' angle is displayed. On the right, there are several icons: a warning triangle labeled 'FORCE', a gauge labeled 'PROD MODE', a key labeled 'KEY FUN', and a square with an 'L' labeled 'AXIS'. Below these is a 'RUN' button with a green play icon. A vertical sidebar on the right contains icons for 'SERVICE' (wrench), 'DIAGNOSIS' (stethoscope), 'SETTINGS' (gear), and a user profile icon labeled 'L8'. The main area is titled 'Run - Production - Status' and contains three widgets: 'Speed' showing '100' with blue up/down arrows, 'OEE' showing '0%' in a donut chart, and 'Production data' showing '0%' in a donut chart. Below the production data is a table:

Good out	383623
Bad out	283
Total out	383906

At the bottom of the main area, there are five buttons: 'Status', 'Enable func.', 'Force func.', 'IPC', and 'HA'. A red circle highlights the 'PackML' status indicator and the '90°' angle display.

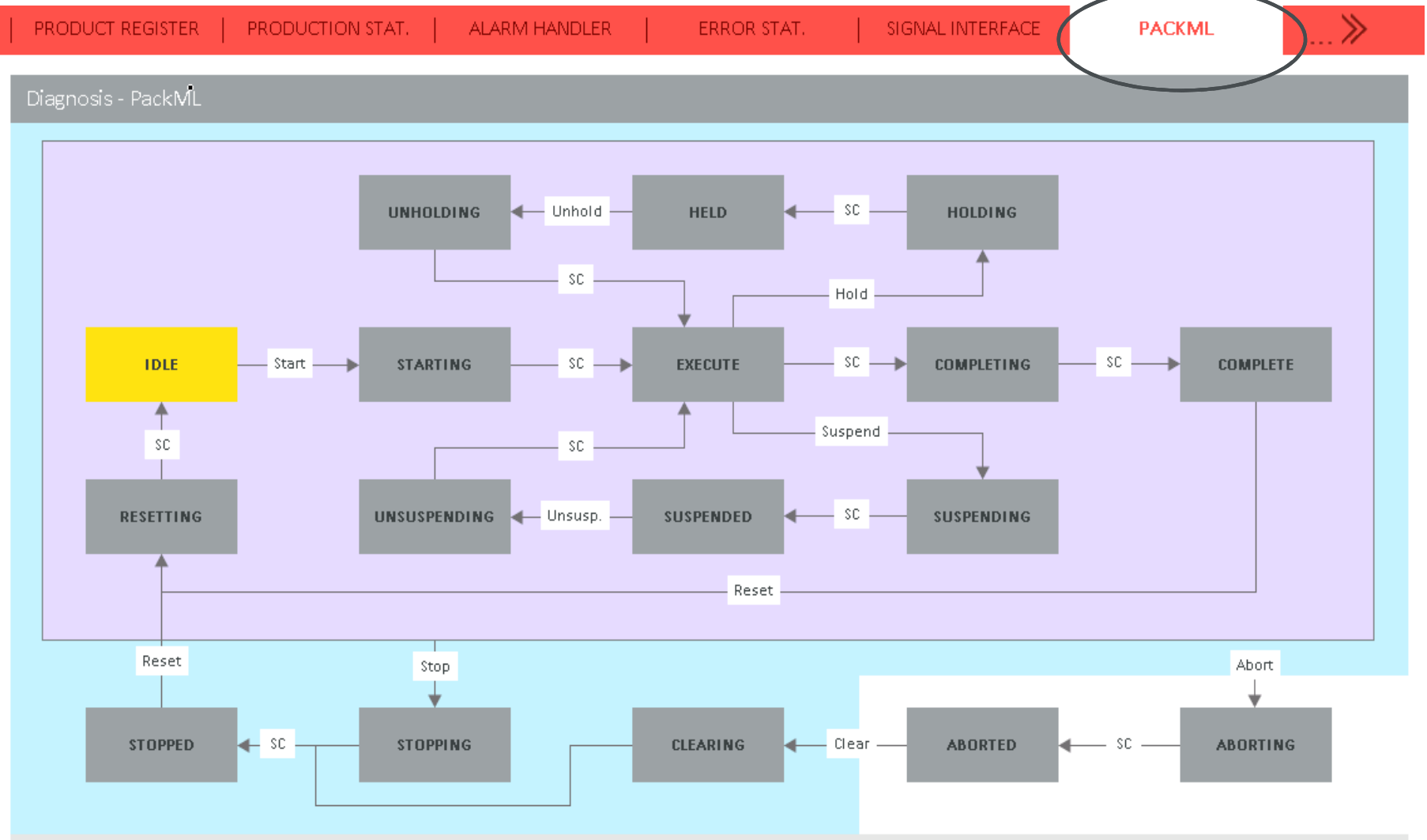
Norden EasyWare PackML HMI interface standard

- The PackML mode and status are always presented in the header of the HMI.



Norden EasyWare PackML HMI interface standard

- The PackML graphical model are part of the diagnostic screens. Colour changes are provided to the states.



Norden PackTags to/from MES interface

- **When we implemented the PackML HMI interface into our HMI in 2002 we were convinced of the advantages of a common “packaging machine language.**
- **However the PackML was not that widely spread 2002 among our customers. it was not until 2012 that we faced more customer request for machine to MES connections.**
- **2012 we needed to bring our MES connection solution to the next level for avoiding too much customer adoptions when a MES connection was requested.**
- **The ISA-TR88.00.02 that included the PackTags is the best provided solution to achieve a “standardized” communication interface. The interface will need adoptions for some machines and some customers but we have reduced these custom adoptions with up to 90% compared to not using the PackTags.**
- **We have found the ISA-TR88.00.02 and OPC-UA to be a good market strategy.**

Norden EasyWare PackTags to/from MES interface

- From 2014 we provide MES PackTags according to ISA-TR88.00.02.
- We provide a Program Design Description (PDD) to our customers.
- We guide customers with no or small experiences by providing our PDD.



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Issue / Project PDD – NF/NC/NTP	Issuer Peter Jarlvik	Department Automation	Date 07-Dec-2016	Page 1/13
File name 7.3.3 - 0453 - 55303	Document category Directive	Document group 7.3.3	Document serial No. 0453	Rev. 6
Document type description Program Design Description Function / Object description ISA 88 Interface - (Sys02)		Reference document		
		Date of approval	Signature of approval	

Distr:

Revision notes

Revision No.	Date	Signature	Revision notes
6	07-Dec-2016	PJa	Added <u>G_stPMLs.RemoteInterface</u> for creating <u>EquipmentInterlock Starved Blocked</u> in compliance of ISA-TR88.00.02 2015. Added <u>Machine powered up time accumulated in hours</u> (ISA-TR88.00.02 2015)
5	21-Jun-2016	PJa	Document adopted also to NTP machines
4	20-May2015	PJa	Removed <u>G_stPMLc.UnitModeChangeRequest</u>
3	12-Mar2015	PJa	Updated with general information mostly for alarm structures.
2	09-Mar-2015	PJa	Updated for OPC UA
1	31_Oct-2014	PJa	Updated and renamed to ISA 88 Interface
0	03-Sep-2014	PJa	Document created

Norden EasyWare PackTags to/from MES interface

- We inform about the implemented technology.
- We recommend OPC-UA for communication of the PackTags.
- Communication by industrial bus is an additional option.



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Issue / Project	PDD – NF/NC/NTP	Issuer	Peter Jarlvik	Department	Automation	Date	07-Dec-2016	Page	3/13
File name	7.3.3 - 0453 - SS303	Document category	Directive	Document group	7.3.3	Document serial No.	0453	Rev.	6

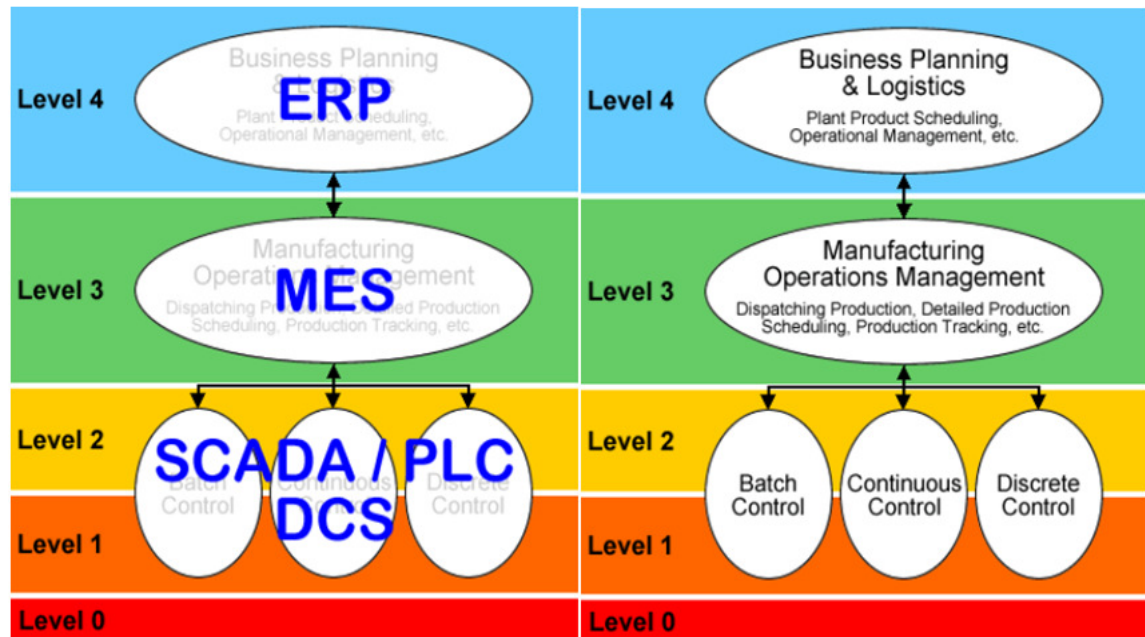
Description – ISA 88 Interface - (Sys02)

General

ISA scope:

The international standards ISA's S-95 and S-88 are suggested practices for control system operability and integration.

ISA 95



Norden EasyWare PackTags to/from MES interface

- The PDD presents what information that can be read from and written to the machine (according to ISA-TR88.00.02).
- Commands by remote are restricted according to our machine safety analyse (SA).



Issue / Project	PDD – NF/NC/NTP	Issuer	Peter Jarlvik	Department	Automation	Date	07-Dec-2016	Page	7/13
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Data

All data in the Norden machine follows the IEC 61131-3 standard. The ISA-TR88.00.02 Technical Report is partly included in the Norden machine.

In general, data that are global in machine controller can be fully readable from a higher system (on OPC). This includes a great amount of data and this is mostly NOT necessary if not especially requested by the customer.

From machine

- Process data (machine speed).
- Production data (product statistics, product counters).
- Alarms / Exceptions (current and history).
- Format number actual running format.
- Mode and state status (PackML tags).

Data are real time and always readable as long as the OPC connection is established.

Option, to machine

- Process data (printing codes to laser/inkjet, identification codes for sensors/vision (Pharma, OCR, OCV, etc.), check weighing targets, machine speed).
- Format number to be activated.
- Mode command (PackML mode tag “Producing”).
- Watch dog for communication check.

Norden EasyWare PackTags to/from MES interface

- Most of the PackTags are directly linked to the ISA-TR88.00.02 for further info.
- For a number of PackTags individual information is needed and closer described in the PDD.



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					Rev. 6

Data list in PacDrive 3 (Norden Easyware Gen.2) system

The list is based on the ISA-TR88.00.02 Technical Report.

Use ISA-TR88.00.02 for references and descriptions of the tags.

Tags NOT included in the “Data list in PacDrive 3” are NOT used by the Norden machines, but some tags can be partly individualized for different machines.

Option, command Tags

Tag name:

G_stPMLc.UnitMode

G_stPMLc.MachSpeed

G_stPMLc.Parameter[1].Name

G_stPMLc.Parameter[1].Value

G_stPMLc.Product[1].ProductID

G_stPMLc.Product[1].ProcessVariable[X].ID

G_stPMLc.Product[1].ProcessVariable[X].Name

G_stPMLc.Product[1].ProcessVariable[X].Unit

G_stPMLc.Product[1].ProcessVariable[X].Value

Description:

Mode 1=Producing is the only allowed mode command to machine.

See ISA-TR88.00.02

Watch dog from higher level system.

Incoming value to be verified and returned at G_stPMLs.Parameter[1].Value

Format number to machine.

Process variables can be changed at machine is using the Product[1].

The variables can be different depending on machine setup. The ProcessVariable[X] start its index according to the first unit that uses the ProcessVariable[X]. -commands and then indexing downstream machine. The tags are as follows:

User defined ID

User defined

Name string for unit/measuring value

User defined

Norden EasyWare PackTags to/from MES interface

- The tags are often customer adopted. An example is the **G_stPMLc.Product [x]ProcessVariable (Command)** and **G_stPMLs.Product [x]ProcessVariable**

Status Tags

Tag name:

G_stPMLs.UnitModeCurrent
G_stPMLs.UnitModeRequested
G_stPMLs.UnitModeChangeInProgress
G_stPMLs.StateCurrent
G_stPMLs.MachSpeed
G_stPMLs.CurMachSpeed
G_stPMLs.Parameter[1].Name
G_stPMLs.Parameter[1].Value
G_stPMLs.Product[1].ProductID

Description:

See ISA-TR88.00.02

Watch dog to higher level system.
 Incoming G_stPMLc.Parameter[1].Value returned here.
 Format number in use.

The process variable can be check/verified by the higher level system at the G_stPMLs.Product[1].ProcessVariable[X]. The data is the actual data used by the machine controller for the current format number in use. The ProcessVariable[X] start its index according to the first unit that uses the ProcessVariable[X]. -commands and then indexing downstream machine.

The variables can be different depending on machine setup. The tags are as follows:

User defined ID

User defined

Name string for unit/measuring value

User defined

G_stPMLs.Product[1].ProcessVariable[X].ID
G_stPMLs.Product[1].ProcessVariable[X].Name
G_stPMLs.Product[1].ProcessVariable[X].Unit
G_stPMLs.Product[1].ProcessVariable[X].Value

G_stPMLs.RemoteInterface[1].Number

Upstream, value is 1

RemoteInterface[1].CmdValue is set to 1 if Norden machine is starved
 (EquipmentInterlock.Starved in ISA-TR88.00.02 2015)

Low level tube infeed, Min level reached Hopper

Downstream, value is 2

RemoteInterface[2].CmdValue is set to 1 if Norden machine is blocked
 (EquipmentInterlock.Blocked in ISA-TR88.00.02 2015)

Obstruction at outlet zone, Downstream machine not ready

G_stPMLs.RemoteInterface[1].CmdValue

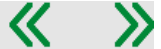
G_stPMLs.RemoteInterface[2].Number

G_stPMLs.RemoteInterface[2].CmdValue

Norden EasyWare PackTags to/from MES interface

- The Schneider Electric PacDrive 3 software has PackTags function blocks that we use in our programming.

ISA_FB_DataManagement



Inputs

Input	Meaning
i_xEnable	Activation of the POU.
i_xResetTimerCounter	This input responds to a rising edge. All mode and state timers and the product counters are reset.
i_diUnitModeCurrent	The currently active operation mode is passed to the POU via this input. The following tag should be applied to the input: <code>Status.UnitModeCurrent</code>
i_diStateCurrent	The currently active state is passed to the POU via this input. The following tag should be applied to the input: <code>Status.StateCurrent</code>
i_axConsumedProduct	Using this array of type BOOL, the products consumed (e.g. film, cardboard) can be counted. Each field <i>i</i> of the array corresponds to a product of the administration tag <code>ProdConsumedCount[i]</code> . The input responds to rising edges.
i_axProcessedProduct	Using this array of type BOOL, the products actually produced can be counted. Each field <i>i</i> of the array corresponds to a product of the administration tag <code>ProdProcessedCount[i]</code> . The input responds to rising edges.
i_axDefectiveProduct	Using this array of type BOOL, the products marked as defective can be counted. Each field <i>i</i> of the array corresponds to a product of the administration tags <code>ProdDefectiveCount[i]</code> . The input responds to rising edges.
i_pstAdmin	Using this pointer, the address of a structure of type <code>ISA_ST_ADMINISTRATION</code> can be passed to the POU.

Inputs

Outputs

Outputs	Meaning
q_xActive	If this output is set to TRUE, the POU is active.
q_xError	If this output is set to TRUE, an error was detected.
q_diResultID	Result no.
q_sResultText	Result Text

Norden EasyWare PackTags to/from MES interface

- As “Process parameters” are allowed to be written to the machine a screen can be provided for value acknowledge by the operator.

Command tags functional description

Values are only acceptable by the machine controller during a controlled state and if the variable “Gc_xISA88_Command” is set to active. The controlled state is activated by entering the “PREPARE” page at the machine HMI.

In the “Process parameter” popup page the “ISA 88 Command” button can be set to active, (this is only needed once). If the “ISA 88 Command” button is not active the values from higher system is not taken into consideration, instead the values are then possible to change locally, but the format nr and speed values will then not be possible to change here.

The operator must press the “Accept data” button to allow the values download into the machine controller.

Process parameters	
11	1:st row tube code/Id tube check system
22	2:nd row tube code/Id tube check system
33	3:rd row tube code/Id tube check system
0123456789	1:st row tube print/check = Batch/LOT no.
2015-03-03	2:nd row tube print/check = Manufacturing date
2020-02-02	3:rd row tube print/check = Expiration date
x348EtL1002	4:th tube print/check = GTIN (Global Trade Item No.)

Enable data from MES

ISA 88 Command enable

Format

1

Speed

50

Accept data

CLOSE

PREPARE popup page example.

Norden PackML ahead

- **The continues work carried out by the OMAC Packaging workgroup will lead automation users into the same path.**
- **As communication between all the levels at a production site will increase a “standardized” interface is needed.**
- **We are always listening to our customers, they are the experts on their own production sites therefor we can´t reject other MES connection requests until that ISA-TR88.00.02 is widely spread and not other solutions are needed.**
- **From a programming view we will reduce the code variables if they have exactly the same function as a PackTag variable. In this way the interface will be more code integrated.**
- **We will not step into a fully integrated Make2Pack solution.**
- **We are exploring how the ISA-TR88.00.02 will be a part of our Industry 4.0 solution.**



THANK YOU

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